

EUROPEAN INSTITUTE OF INNOVATION, ENTREPRENEURSHIP AND TECHNOLOGY

MODULE

Operations Management in Hospitality

Lean Management and Efficiency in Hospitality Operations:

A Case Study of Hilton Hotels

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Abstract

Lean management, a philosophy of continuous waste elimination and value creation first developed within the Toyota Production System, has been applied with increasing frequency to service industries over the past two decades, yet its adoption in hospitality remains comparatively underexplored and inconsistently branded. This report examines the case of Hilton Hotels & Resorts, one of the world's largest hotel groups, to assess how lean-consistent principles have been used to streamline operations, reduce waste, and maintain high service standards, even though Hilton does not publicly describe its practices using formal lean terminology. Drawing on academic literature on lean management in hotels alongside Hilton's own documented initiatives, the report examines two major pillars of Hilton's operational streamlining: LightStay, a proprietary sustainability performance measurement system that embeds standardisation, visual management, and continuous improvement into resource use across the global portfolio, and Hilton's digital guest-journey technologies, including Digital Key and Connected Room, which have been associated with reported reductions in check-in time and increased guest satisfaction. The findings suggest that Hilton has achieved outcomes consistent with lean philosophy, reduced waste, improved efficiency, and reallocation of staff time toward higher-value guest interactions, primarily through data-driven continuous improvement and technology-enabled process redesign rather than a formally named lean transformation programme. The report critically discusses the implications of this informal, unbranded approach to lean adoption, situates Hilton's practices against the broader hospitality lean literature, and considers the labour and service-quality trade-offs that efficiency-focused operational strategies can introduce.

1. Introduction

Lean management originated within Toyota's manufacturing operations in the mid-twentieth century as a philosophy for making production more flexible and responsive while systematically eliminating activities that do not add value for the customer (Perdomo-Verdecia et al., 2022). Over subsequent decades, the core ideas underpinning lean, identifying value from the customer's perspective, mapping the value stream, eliminating waste, and pursuing continuous improvement, have been extended well beyond their manufacturing origins into services, healthcare, higher education, and, increasingly, hospitality (Rauch et al., 2016). Applying lean thinking to hospitality is not straightforward: hotels sell an intangible, perishable service produced and consumed simultaneously, a context quite different from the repeatable, physical production lines lean was originally designed for. Nevertheless, a growing body of research argues that lean-consistent practices, waste reduction, standardisation, visual management, and continuous improvement, can meaningfully improve hotel operations without compromising service quality (Vlachos & Bogdanovic, 2013).

This report examines how lean management principles have been applied within Hilton Hotels & Resorts, one of the world's largest hotel companies, to streamline operations and reduce waste while maintaining the brand's high-quality service standards. Unlike some hospitality organisations that have explicitly adopted named Lean Six Sigma programmes, such as Starwood Hotels in the early 2000s (Rauch et al., 2016), Hilton's publicly documented continuous improvement efforts are branded primarily around sustainability and guest-experience technology rather than lean management as such. This report treats that distinction as analytically significant rather than incidental: it asks not only what Hilton has done, but how closely what Hilton has done maps onto lean principles as defined in the academic literature, and what that gap between practice and branding reveals about the state of lean adoption in hospitality more broadly.

The report pursues three linked objectives. First, it reviews the academic literature on lean management in hotels to establish the theoretical vocabulary, waste types, tools, and known limitations, against which Hilton's practices can be assessed. Second, it examines two major pillars of Hilton's documented operational streamlining: Light Stay, its proprietary sustainability performance measurement system, and its suite of digital guest-journey technologies, including Digital Key and Connected Room. Third, it critically analyses the impact of these practices on cost reduction, operational efficiency, and customer satisfaction, while considering the labour and

service-quality trade-offs that efficiency-focused operational strategies can introduce in a people-intensive service industry.

The report is structured as follows. Section 2 reviews the literature on lean management's origins, its application to services and hospitality specifically, the tools most commonly used in hotel settings, and critiques of lean's limits and risks in a labour-intensive service context. Section 3 outlines the case study methodology used to examine Hilton. Section 4 presents the findings, organised around Hilton's continuous improvement infrastructure, its resource efficiency practices, its guest-journey digitisation, and the resulting impact on cost, efficiency, and satisfaction. Section 5 offers a critical discussion synthesising these findings against the literature, and Section 6 concludes with a summary and practical implications.

2. Literature Review

2.1 Origins and Principles of Lean Management

Lean management, also referred to as lean thinking or lean production, emerged from the Toyota Production System, developed in Japan in the decades following the Second World War, when Toyota needed to make production more flexible in order to serve smaller, more varied markets than the mass-production model of Western manufacturers allowed (Perdomo-Verdecia et al., 2022). The philosophy was later codified and popularised for a global audience by Womack and colleagues, who distilled it into five core principles: specifying value from the standpoint of the end customer, identifying the value stream for each product or service and removing steps that do not add value, making the remaining value-creating steps flow without interruption, allowing customer demand to pull production rather than pushing output based on forecasts, and pursuing perfection through continuous, incremental improvement (Perdomo-Verdecia et al., 2022).

Central to lean thinking is the identification and elimination of waste, or *muda*, activities that consume resources without creating value for the customer. The lean literature traditionally identifies seven categories of waste, overproduction, waiting, transportation, over-processing, excess inventory, unnecessary motion, and defects, with an eighth, underutilised human talent, frequently added in later service-sector applications (Rauch et al., 2016). Waste reduction under lean is pursued through a recognisable toolkit, including 5S workplace organisation (sort, set in order, shine, standardise, sustain), value stream mapping (VSM) to visualise and analyse process flow, Kaizen events for structured, team-based continuous improvement, Kanban systems for pull-based inventory replenishment, and visual management techniques that make process performance immediately visible to those doing the work (Rauch et al., 2016).

2.2 Lean in Service and Hospitality Contexts

The transfer of lean principles from manufacturing to services is not automatic. Services are typically intangible, heterogeneous, and produced and consumed simultaneously, characteristics that complicate the direct application of tools designed for repeatable physical production lines (Vlachos & Bogdanovic, 2013). Despite this, lean has been applied with reported success across a range of service industries, and hospitality specifically has attracted a small but growing body of academic attention. A systematic literature review of lean management research in hotels identified only thirty-six relevant references across the entire field, a finding the authors

interpret as clear evidence of how underdeveloped this research area remains relative to lean's manufacturing literature (Perdomo-Verdecia et al., 2022).

Nevertheless, the existing hospitality lean literature has produced consistent findings. Vlachos and Bogdanovic (2013), surveying small and medium-sized hotels across nineteen European countries, found that hotels do apply value-mapping techniques in practice, and that these techniques can have a high impact on detecting and eliminating waste both upstream and downstream in hotel operations, particularly in guest reservation and reception processes and in procurement systems. The same study observed that despite this potential, lean management implementation in hotels remained, even by 2013, an emerging field with scant empirical evidence, a finding later research continued to confirm (Perdomo-Verdecia et al., 2022).

One of the clearest documented examples of lean adoption at scale in hospitality is Starwood Hotels, which implemented Lean Six Sigma in 2001. Reported outcomes included a 19 percent increase in incremental revenue and a nearly 12 percent increase in customer spending during their stay in the months following implementation, with the centralisation of the company's spa reservations group using Six Sigma tools associated with a substantial reported revenue increase (Rauch et al., 2016). This example is frequently cited in the literature precisely because named, branded lean or Lean Six Sigma programmes remain rare in hospitality; most hotel companies that adopt lean-consistent practices do so without the explicit branding, terminology, or top-down programme structure associated with Starwood's approach (Rauch et al., 2016).

2.3 Lean Tools Applied in Hotels

Where lean tools have been studied in hotel settings, 5S and value stream mapping dominate the literature, applied most often to housekeeping, kitchen operations, front-desk and reception processes, and procurement (Perdomo-Verdecia et al., 2022). A case study of a hotel kitchen in Bogor, for instance, found that multi-skilled worker deployment and 5S had already been informally implemented, and that value stream mapping revealed inefficiencies in how breakfast dishes were semi-prepared and held before service; the study identified forming a dedicated Kaizen improvement team as the highest-priority lean intervention, ahead of visual management and Kanban-style pull replenishment (Annisa et al., 2022). Similarly, an assessment of lean supply chain practices across hotel operations found that implementation levels varied considerably between properties, but that lean practices, where present, were associated with

improved understanding of customer requirements and stronger downstream supply chain performance (Tortorella et al., 2019).

Visual management, a lean tool that makes process performance and abnormalities immediately visible to staff without requiring detailed reports, recurs across multiple hospitality lean studies as a particularly transferable tool, since it fits naturally into the visually oriented, guest-facing nature of hotel operations (Perdomo-Verdecia et al., 2022). Just-in-time principles, minimising inventory and producing only what is needed when it is needed, have also been studied in hotel contexts, particularly around housekeeping supply replenishment and food and beverage preparation, where excess inventory directly increases spoilage risk and holding cost (Perdomo-Verdecia et al., 2022).

2.4 Critiques and Limits of Lean in Hospitality

The hospitality lean literature is not uncritical. Because lean's cost and efficiency benefits in a labour-intensive service industry are frequently realised through changes to staffing levels, scheduling, and task allocation, several scholars have raised concerns about the effect of lean-style efficiency drives on hotel workers. An influential early critique examined labour flexibilisation in the Australian hotel industry and argued that hotel companies' pursuit of leaner, more flexible labour deployment, restructuring working time, payment systems, and labour costs on a broadly "just-in-time" basis, could not be adequately explained as a straightforward efficiency gain, and instead reflected a wider strategy of cost minimisation with real consequences for job security and working conditions (Timo, 2001). This critique is captured succinctly in the paper's title, which poses the question of whether lean-inspired labour practices in hotels are better understood as genuinely "lean" or simply "mean" (Timo, 2001).

More recent hospitality lean research has also identified structural barriers to adoption. Perdomo-Verdecia et al. (2022) note that most existing studies focus on four- and five-star hotels, leaving smaller and lower-category properties comparatively unstudied, and that geographical coverage remains uneven, with limited research on lean adoption in the United States despite it being a major hospitality market. The same review argues that the lack of accessible, practically oriented academic research, combined with limited awareness of lean management within the hotel business community itself, may be actively holding back both the further development of lean thinking in hospitality and its uptake in practice.

3. Methodology

This report adopts a qualitative, single-case study design, examining Hilton Hotels & Resorts as an instance of lean-consistent operational practice in a major global hotel group. A case study approach was selected because the assignment brief calls specifically for an examination of lean implementation at Hilton, and because case studies are well suited to exploring how a complex, multi-faceted management philosophy such as lean is translated into practice within a specific organisational context, something a broad multi-company survey would not permit in comparable depth.

Evidence was gathered through a structured search of academic databases, including ScienceDirect, ResearchGate, and MDPI journals, using search terms combining "lean management", "lean thinking", "waste reduction", and "continuous improvement" with "hotel", "hospitality", and "Hilton" specifically. This search returned a substantial body of general hospitality lean literature but comparatively little peer-reviewed material naming Hilton directly in relation to lean management as such. To address this gap, the search was extended to include Hilton's own corporate documentation, sustainability reporting, and press releases, together with an independent peer-reviewed case study of Hilton's LightStay sustainability performance measurement system (Zientara et al., 2020) and an energy-management case study published by the Clean Energy Ministerial, an intergovernmental forum on clean energy policy.

This search strategy reflects an important methodological reality acknowledged explicitly in this report: Hilton does not publicly brand its operational improvement programmes using formal lean terminology, unlike Starwood Hotels' documented Lean Six Sigma initiative (Rauch et al., 2016). Consequently, this report does not claim that Hilton has implemented a named, formal lean transformation. Instead, it uses the lean management framework established in the literature review, waste elimination, standardisation, visual management, and continuous improvement, as an analytical lens through which to interpret and assess Hilton's documented operational practices, principally LightStay and its guest-journey digitisation initiatives, on their own terms.

Sources were evaluated for reliability and weighted accordingly. Peer-reviewed academic sources and Hilton's own official corporate communications (press releases published via Hilton's newsroom, and its associated sustainability reporting infrastructure) were treated as the strongest evidence. Industry commentary and technology-vendor or marketing-oriented sources reporting specific performance statistics, such as reported percentage reductions in check-in time, were

included where they added concrete, checkable detail unavailable in academic sources, but are flagged in the findings as industry-reported figures rather than independently audited or peer-reviewed data, and are interpreted with appropriate caution.

This methodology carries clear limitations. As a single-case, desk-based study relying entirely on secondary and organisational sources, it cannot verify Hilton's internal processes directly, was not able to conduct primary interviews with Hilton staff or guests, and cannot fully separate genuine operational improvement from the promotional framing inherent in corporate and marketing sources. Because Hilton's own published material naturally emphasises successes rather than setbacks, this report's account of Hilton's practices may understate implementation challenges, failed initiatives, or negative side effects that a company would be unlikely to publicise, a limitation addressed partly, but not fully, by incorporating independent academic critique in the discussion that follows.

4. Findings

4.1 Hilton's Continuous Improvement Infrastructure: LightStay

The clearest evidence of lean-consistent practice at Hilton is LightStay, a proprietary sustainability performance measurement system (SPMS) launched in 2010 and required for use across both managed and franchised properties globally through Hilton's Brand Standards (Zientara et al., 2020). LightStay tracks more than 200 sustainability-related metrics spanning energy, water, and waste, extending into operational areas including housekeeping practices, paper product use, food waste, chemical storage, and transportation (Zientara et al., 2020). Properties are required to enter energy, water, and waste data on a monthly basis, and every property is expected to set measurable reduction goals and demonstrate ongoing improvement projects, a structure that closely mirrors the standardised, metrics-driven, continuous-improvement cycle at the heart of lean philosophy (Clean Energy Ministerial, n.d.).

By the time LightStay 4.0 was introduced in 2015, the system had accumulated 250,000 months of utility consumption data and had supported roughly 20,000 individual improvement projects across Hilton's portfolio, evolving in the process into what researchers describe as a big-data platform for organisational learning (Zientara et al., 2020). LightStay's design incorporates features directly analogous to lean visual management: colour-coded performance tiles score individual properties, charts benchmark performance against peer hotels to encourage friendly competition, and automatic alerts notify hotel teams whenever actual performance falls below an expected baseline (Clean Energy Ministerial, n.d.). This combination of standardised measurement, visible performance feedback, and automated variance alerts closely parallels the andon and visual control systems used in lean manufacturing to make abnormalities immediately visible to those able to act on them.

4.2 Standardisation and Energy/Resource Efficiency

Hilton's pursuit of standardised, auditable energy performance extended beyond LightStay itself. Hilton leadership expressed interest in the international energy management standard ISO 50001 as soon as it was published in 2011, viewing certification as an opportunity to drive further portfolio-wide energy improvement, a business case strengthened when the European Commission's 2012 Energy Efficiency Directive required Hilton's European properties to certify under the standard (Clean Energy Ministerial, n.d.). Achieving ISO 50001 certification requires

an organisation to establish standardised energy management processes, systematically identify waste, and commit to continuous, auditable improvement, requirements that align closely with lean management's own emphasis on standardised work and continuous improvement (Kaizen) as prerequisites for sustained efficiency gains.

The organisational documentation reviewed for this report explicitly describes a "culture of continuous improvement" embedded within Hilton's operations, crediting this culture with the company's early and sustained interest in ISO 50001 certification (Clean Energy Ministerial, n.d.). Hilton's pursuit of external recognition for this approach is also documented: the company was named to the Dow Jones Sustainability Index (DJSI) for the first time following a rigorous performance assessment, an outcome its own case-study documentation attributes in part to the standardisation and continuous tracking infrastructure LightStay provided (Clean Energy Ministerial, n.d.).

4.3 Streamlining the Guest Journey: Digital Key and Connected Room

Beyond resource efficiency, Hilton has pursued a second, guest-facing form of operational streamlining through digital technology, most visibly through its Digital Key and Connected Room initiatives. Digital Key allows guests to bypass the front desk entirely, using the Hilton Honors mobile app to complete check-in, unlock their room, and, in later iterations, unlock elevators and share room access with companions, without needing a physical key card or, in many cases, any direct interaction with front-desk staff (Hilton, 2022). Industry reporting indicates that over 90 million digital key downloads have been recorded since the feature's launch, and that more than 245,000 hotel rooms have been equipped with Connected Room technology, which extends the guest's digital control to in-room features such as the television and temperature settings (industry-reported figures; see Section 3 methodological caveats).

From a lean perspective, Digital Key and its associated features directly target one of the classic categories of service waste: waiting. A hotel technology industry source reports that guest satisfaction scores can fall by as much as 50 percent when a guest experiences a five-minute wait at check-in, and that digital, keyless check-in is associated with an average 7 percent increase in guest satisfaction scores by removing that wait entirely (Hotel Tech Report, 2022). Hilton's own communications describe the objective explicitly in efficiency terms, noting that faster, technology-enabled front-desk transactions are intended to reduce guest waiting time while

increasing the amount of time hotel staff can dedicate to personalised service rather than administrative check-in tasks (Hilton, 2023), an explicit reallocation of staff effort away from a low-value administrative task and toward higher-value guest interaction that mirrors lean's core objective of eliminating non-value-adding work.

4.4 Impact on Cost Reduction and Operational Efficiency

The efficiency gains reported in connection with Hilton's initiatives cluster around two areas: resource cost and staff time. On the resource side, LightStay's monthly tracking of energy, water, and waste data, combined with property-level reduction targets, is designed explicitly to lower utility costs across the portfolio over time, while its forecasting capability, projecting expected energy and water cost and consumption based on variables such as occupancy and weather, supports more accurate budget planning and allows deviations from expected performance to be identified and corrected quickly rather than discovered only at the end of a billing cycle (Zientara et al., 2020).

On the staff-time side, industry reporting associates Hilton's digital check-in features with a 30 percent reduction in check-in time and improved operational efficiency for front-desk staff (industry-reported figures). If broadly accurate, this reduction represents a meaningful reallocation of labour capacity: time previously spent on routine administrative processing becomes available for tasks lean philosophy would classify as value-adding, direct guest service, problem resolution, and personalised interaction. Hilton's intelligent guest-messaging system, which routes guest requests and queries directly to the appropriate staff member, is reported to have processed over 76 million messages, with Hilton attributing to this system a 23-point increase in stay scores specifically related to effective problem resolution (industry-reported figures), a plausible outcome of freeing staff time from lower-value administrative work to redirect toward the kind of responsive service recovery that most directly shapes guest satisfaction.

4.5 Impact on Customer Satisfaction and Service Quality

Academic and industry evidence reviewed for this report suggests that Hilton's efficiency initiatives have been designed with guest experience protection, rather than pure cost reduction, as an explicit constraint. LightStay's continuous improvement projects are framed around sustainability performance rather than labour cost-cutting specifically, and the system's design, incorporating peer benchmarking and automated alerts, aims to sustain performance improvement

over time rather than deliver a single one-off cost reduction (Zientara et al., 2020). Similarly, Hilton's digital guest-journey technologies are consistently marketed and, according to reported guest survey data, perceived by guests primarily as convenience features rather than service reductions: a reported 80 percent of Hilton guests indicated a preference for digital keys over physical alternatives, citing convenience and security as the primary reasons (industry-reported figures).

This pattern is broadly consistent with the wider hospitality lean literature's finding that lean-consistent practices, properly implemented, need not come at the expense of service quality, and can in some cases enhance it by removing friction points, such as check-in waiting time, that guests themselves identify as detracting from their experience (Vlachos & Bogdanovic, 2013). However, this report's reliance on Hilton's own reported statistics for several of these specific figures, digital key adoption rates, satisfaction score increases, and check-in time reductions, means these findings should be read as indicative of a broadly positive relationship between Hilton's efficiency initiatives and guest satisfaction, rather than as independently audited proof of a precise causal effect.

5. Discussion

The findings suggest that Hilton has achieved outcomes broadly consistent with lean management philosophy, waste reduction, standardisation, continuous improvement, and a reallocation of effort toward value-adding activity, without adopting the formal branding, terminology, or top-down programme structure that characterises named lean transformations such as Starwood's Lean Six Sigma initiative (Rauch et al., 2016). This gap between substance and branding is itself an important finding. It supports the argument, made repeatedly in the hospitality lean literature, that evidence of lean thinking deployed at scale by global hotel brands remains scarce even where lean-consistent outcomes are being achieved, because the practices are pursued under other labels, sustainability, digital innovation, guest experience, rather than under the lean management banner itself (Perdomo-Verdecia et al., 2022).

LightStay illustrates this dynamic clearly. Considered purely on its mechanics, standardised monthly data collection, mandatory property-level targets, visual performance benchmarking, and automated deviation alerts, the system performs functions almost identical to lean's standard work, visual management, and Kaizen cycle (Zientara et al., 2020). Yet LightStay is documented and studied in the literature exclusively as a corporate responsibility and sustainability performance measurement system, not as a lean management tool, and Hilton's own case-study documentation frames its purpose around environmental performance and certification (ISO 50001, the Dow Jones Sustainability Index) rather than operational efficiency as such (Clean Energy Ministerial, n.d.). This raises a genuine interpretive question this report cannot fully resolve: whether LightStay represents lean thinking operating under a sustainability label, or whether the resemblance between the two frameworks is coincidental, reflecting the fact that structured continuous-improvement systems tend to converge on similar mechanics, standardisation, visibility, and feedback loops, regardless of the specific philosophy that inspired their design.

Hilton's digital guest-journey technologies present a similarly instructive case, though with an important caveat about evidence quality. Digital Key and Connected Room map closely onto lean's classic objective of eliminating waiting, one of the seven traditional categories of waste, by removing a friction point, the front-desk queue, that guests themselves identify as detracting from satisfaction (Hotel Tech Report, 2022). The explicit framing in Hilton's own communications, that faster front-desk transactions free staff time for higher-value personalised service, is close to a

textbook articulation of lean's goal of reallocating effort from non-value-adding to value-adding activity (Hilton, 2023). However, because several of the specific performance statistics discussed in the findings, digital key adoption figures, satisfaction score increases, check-in time reductions, are drawn from industry and organisational sources rather than independently audited or peer-reviewed research, this report treats them as plausible and directionally consistent with lean outcomes rather than as rigorously verified causal evidence. A more cautious reading would note that a large, well-resourced global hotel brand has strong incentives to publicise favourable statistics about its own technology investments, and that the absence of independent academic scrutiny of these specific figures is a genuine limitation of the evidence base.

The critical literature on lean and labour raises a further, more challenging question this report must confront directly. Timo's (2001) analysis of labour flexibilisation in the Australian hotel industry argues that lean-inspired efficiency drives in hospitality can function as cost-minimisation strategies with real consequences for job security and working conditions, prompting the paper's central question of whether such practices are genuinely lean or simply mean. Applied to Hilton, the evidence reviewed in this report does not directly address staffing levels, scheduling practices, or working conditions in enough depth to confirm or refute this concern; Hilton's own documentation, understandably, foregrounds guest-facing benefits and sustainability outcomes rather than any workforce impact of its efficiency initiatives. This is a meaningful gap. Because lean's efficiency gains in a labour-intensive service industry are frequently realised, at least in part, through changes to how staff time is allocated, a genuinely rigorous assessment of whether Hilton's practices constitute lean management in the fullest sense, rather than efficiency-branded cost reduction, would need to examine staff-level outcomes directly, something beyond the scope of the publicly available, largely corporate-sourced evidence this report was able to draw on.

Finally, the findings should be read against the broader limitation identified throughout the literature review: hospitality lean research remains concentrated on larger, higher-category hotels, with far less known about how, or whether, similar practices could be adopted by smaller or independent properties lacking Hilton's scale, technology budget, and brand-standard enforcement mechanisms (Perdomo-Verdecia et al., 2022). Much of what makes LightStay and Hilton's digital guest-journey technologies effective, mandatory brand-wide rollout, centralised data infrastructure, dedicated technology development budgets, depends on resources and organisational reach that most hospitality businesses simply do not have. This suggests that

Hilton's case, while genuinely instructive about what lean-consistent practice can look like in hospitality, may be a poor guide to how such practices could be adapted for the small and medium-sized hotels that make up the majority of the global hospitality sector.

6. Conclusion

This report examined how lean management principles have been applied within Hilton Hotels & Resorts, focusing on two major pillars of the company's documented operational streamlining: LightStay, its proprietary sustainability performance measurement system, and its digital guest-journey technologies, including Digital Key and Connected Room. The evidence reviewed indicates that Hilton has achieved outcomes broadly consistent with lean management philosophy, standardised, data-driven continuous improvement in resource efficiency, and the reallocation of staff time from administrative processing toward higher-value guest interaction, while its own reported figures suggest these efficiency gains have not come at the expense of guest satisfaction and, in the case of digital check-in, may have measurably improved it.

At the same time, this report has been careful to note that Hilton does not publicly describe these initiatives using formal lean management terminology, unlike Starwood Hotels' explicitly branded Lean Six Sigma programme. This distinction matters: it suggests that lean-consistent outcomes in hospitality can emerge from practices developed under other strategic banners, sustainability, digital innovation, guest experience, without the organisation ever adopting lean as an explicit management philosophy. Whether this represents lean thinking operating under a different name, or simply a structural convergence between different continuous-improvement frameworks, remains an open question the available evidence cannot fully settle.

Three practical implications follow from these findings. First, hospitality organisations seeking to replicate Hilton's approach should recognise that its most effective tools, standardised property-wide data collection, visual performance benchmarking, and automated deviation alerts, are lean-consistent regardless of what label an organisation chooses to give them, and can in principle be pursued without a formally branded lean programme. Second, technology-enabled reduction of guest-facing waiting time, such as Hilton's Digital Key initiative, appears to be a comparatively low-risk, high-return application of lean thinking in hospitality, since it targets a friction point guests themselves recognise and value having removed. Third, and most importantly, any hospitality organisation pursuing lean-style efficiency gains should treat workforce impact as a first-order concern requiring direct evaluation, not an incidental afterthought, given the legitimate critique in the literature that efficiency-branded initiatives in labour-intensive service industries can shade into cost-minimisation strategies with real costs for staff. Future research examining Hilton's workforce outcomes directly, rather than relying on the company's own guest-

and sustainability-focused reporting, would meaningfully strengthen the evidence base this report has necessarily had to work within.

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Appendices

Appendix A: Mapping of Hilton Practices Against Lean Principles

Lean Principle / Waste Type	Documented Hilton Practice	Evidence Source
Standardised work / continuous improvement (Kaizen)	LightStay: mandatory monthly data entry, property-level reduction targets, 20,000+ improvement projects	Zientara et al. (2020)
Visual management	LightStay colour-coded performance tiles; peer benchmarking charts; automated deviation alerts	Clean Energy Ministerial (n.d.)
Waste elimination: waiting	Digital Key / Connected Room removing front-desk queuing; reported 30% check-in time reduction	Hilton (2022, 2023); Hotel Tech Report (2022)
Reallocating effort to value-adding work	Staff time freed from administrative check-in redirected to personalised guest service	Hilton (2023)
Standardised certification / auditability	ISO 50001 energy management certification across European properties	Clean Energy Ministerial (n.d.)

Appendix B: Search Strategy Summary

Databases and sources searched: ScienceDirect, ResearchGate, MDPI (Energies), Google Scholar, Hilton's official newsroom and sustainability documentation, and independent hospitality technology publications.

Search terms: "lean management", "lean thinking", "waste reduction", "continuous improvement" combined with "hotel", "hospitality", and "Hilton".

Inclusion criteria: Peer-reviewed journal articles on lean management in hospitality; Hilton's own official corporate/press documentation; independent academic case studies of Hilton's operational systems; industry technology sources providing specific, checkable performance detail, flagged as such where used.

Key limitation: Hilton does not publicly use formal lean management terminology, so evidence is interpretive, mapping documented Hilton practices onto the lean framework established in the literature review, rather than reporting on a named, company-branded lean programme.