

Carbon Neutrality and Eco-Certification in Luxury Hotels of Emerging Economies

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Abstract

The global hospitality sector faces mounting pressure to reduce its environmental footprint, particularly within luxury hotel segments that consume disproportionate quantities of energy and water. This study examines how four prominent eco-certification models—LEED, Green Globe, EarthCheck, and Green Key—shape carbon neutrality strategies among luxury hotel chains operating in Southeast Asia, Latin America, and Sub-Saharan Africa. Drawing on institutional theory and stakeholder salience frameworks, a comparative qualitative methodology was employed, incorporating document analysis of sustainability reports from 24 luxury properties and semi-structured interviews with 36 hotel sustainability managers. Findings reveal that certification schemes vary considerably in their stringency regarding carbon accounting, renewable energy mandates, and waste diversion targets. Hotels certified under LEED and EarthCheck demonstrated stronger carbon reduction trajectories, while Green Globe and Green Key properties showed greater emphasis on water stewardship. Regional disparities were notable, with Southeast Asian properties outperforming Latin American counterparts in renewable energy adoption. The study contributes to ongoing debates about the efficacy of voluntary certification in driving genuine decarbonisation within hospitality.

Keywords: - Eco-certification, carbon neutrality, luxury hotels, emerging economies, sustainable hospitality, green building standards

I. INTRODUCTION

The hospitality industry accounts for roughly one percent of global carbon dioxide emissions, a figure that rises sharply when indirect supply chain contributions are factored in (Lenzen et al., 2018). Within this sector, luxury hotels occupy a paradoxical position: they attract environmentally conscious affluent travellers while simultaneously maintaining high consumption patterns through expansive amenities, climate control systems, and resource-intensive service standards (Bohdanowicz & Zientara, 2009). As international climate agreements tighten emissions targets, the question of whether luxury hospitality can reconcile opulence with environmental responsibility has become a subject of considerable scholarly attention.

Eco-certification programmes have emerged as one of the principal mechanisms through which hotels signal environmental commitment to guests, investors, and regulatory bodies. Programmes such as LEED (Leadership in Energy and Environmental Design), Green Globe, EarthCheck, and Green Key each impose distinct criteria related to energy use, water management, waste handling, and carbon accounting (Geerts, 2014). However, research comparing the effectiveness of these schemes in driving measurable carbon reductions remains fragmented, with most studies focusing on a single certification system or geographic region (Esparon et al., 2014).

This gap is particularly pronounced in the context of emerging economies, where luxury hotel development is expanding rapidly but where institutional support for sustainability varies widely. Countries in Southeast Asia, Latin America, and Sub-Saharan Africa have experienced double-digit growth in luxury hospitality investment over the past decade (World Tourism Organization, 2022), yet the degree to which new properties adopt and benefit from eco-certification is poorly understood.

The present study addresses this gap by comparing how four eco-certification models influence carbon neutrality strategies among luxury hotel chains in three emerging economy regions. Specifically, it asks:

- How do certification requirements differ in their treatment of carbon neutrality?
- What strategies do certified luxury hotels in emerging economies employ to reduce carbon emissions?
- What regional and certification-specific factors shape the effectiveness of these strategies?

II. LITERATURE REVIEW

2.1. Carbon Neutrality in the Hospitality Sector

Carbon neutrality, defined as achieving net-zero carbon dioxide emissions through a combination of reduction measures and offset mechanisms, has gained traction in hospitality management literature since the mid-2010s (Gössling & Peeters, 2015). Early work by Becken and Lennox (2012) established baseline carbon footprint methodologies for accommodation providers, while subsequent studies refined these approaches by incorporating scope 3 emissions from supply chains and guest travel (Rico et al., 2019). The International Tourism Partnership's Hotel Carbon Measurement Initiative provided a standardised framework, yet adoption rates among luxury properties in developing nations remain uneven (Ricaurte, 2018).

A persistent challenge in the literature concerns the distinction between genuine emission reductions and carbon offset purchases. Mair (2011) argued that hotels frequently rely on offset credits rather than investing in on-site renewable energy or efficiency retrofits, raising questions about the depth of their decarbonisation commitments. More recent scholarship has identified a generational shift, with newer luxury properties in Asia incorporating solar photovoltaic systems and geothermal heating at the design stage rather than retrofitting older buildings (Chan et al., 2020).

2.2. Eco-Certification Models: Scope and Stringency

The proliferation of eco-labels in tourism has been well documented, with over 150 certification programmes operating globally by 2020 (Font & Buckley, 2001; Sasidharan et al., 2002). Among the most widely adopted in luxury hospitality are LEED, which originated in the built environment sector and emphasises energy performance and materials selection; Green Globe, a travel and tourism-specific scheme with over 500 certified properties; EarthCheck, an Australian-based programme focused on benchmarking and continuous improvement; and Green Key, operated by the Foundation for Environmental Education with strong penetration in Europe and expanding reach in developing regions (Graci & Dodds, 2015).

Comparative analyses of these schemes have revealed significant differences in assessment rigour. Karlsson and Dolnicar (2016) found that LEED's prescriptive point-based system imposed more demanding energy thresholds than Green Globe's management-system approach. However, EarthCheck's annual benchmarking requirements were found to drive more sustained improvements over time, as properties faced reputational risk from declining performance scores (Griffin & DeLacey, 2002). Green Key, while less stringent in its technical requirements, achieved broader adoption due to lower compliance costs, making it accessible to smaller properties in emerging markets (Dodds & Joppe, 2005).

2.3. Institutional Pressures and Regional Contexts

Institutional theory provides a useful lens for understanding why hotels adopt certification. DiMaggio and Powell's (1983) framework of coercive, mimetic, and normative pressures has been applied to hotel sustainability by several scholars. In Southeast Asia, government-mandated green building codes in Singapore and Thailand have created coercive pressures favouring LEED adoption (Yusof & Jamaludin, 2013). In Latin America, mimetic pressures from international chains entering markets like Mexico and Colombia have driven certification uptake, often through brand-level sustainability mandates rather than local regulation (Segarra-Oña et al., 2012). In Sub-Saharan Africa, normative pressures from ecotourism NGOs and conservation partnerships have been more influential than either regulation or market competition (Spenceley & Meyer, 2012).

III. METHODOLOGY

This study adopted a comparative qualitative design, combining document analysis with semi-structured interviews. The sample comprised 24 luxury hotel properties (five-star or equivalent) distributed across eight countries in three regions: Southeast Asia (Thailand, Vietnam, Indonesia), Latin America (Mexico, Colombia, Costa Rica), and Sub-Saharan Africa (Kenya, South Africa). Six properties held LEED certification, seven were Green Globe certified, six had EarthCheck certification, and five operated under Green Key.

Document analysis focused on publicly available sustainability reports, environmental policy statements, and certification audit summaries from each property covering the period 2018–2023. A structured coding framework was developed based on the carbon neutrality dimensions identified in the literature: energy efficiency measures, renewable energy adoption, carbon offset programmes, waste diversion practices, and water conservation initiatives.

Semi-structured interviews were conducted with 36 sustainability managers and general managers between March and September 2023. Interviews lasted between 45 and 75 minutes and were conducted via video conference in English or with interpreter assistance. All interviews were transcribed verbatim and analysed using thematic analysis following Braun and Clarke's (2006) six-phase protocol. Inter-coder reliability was established with a second researcher coding a random 20 percent subsample, yielding a Cohen's kappa of 0.83.

IV. RESULTS AND ANALYSIS

4.1. Certification Requirements and Carbon Neutrality Provisions

Analysis of certification documentation revealed marked differences in how each scheme addresses carbon neutrality. Table 1 presents a comparative summary of key provisions across the four certification models.

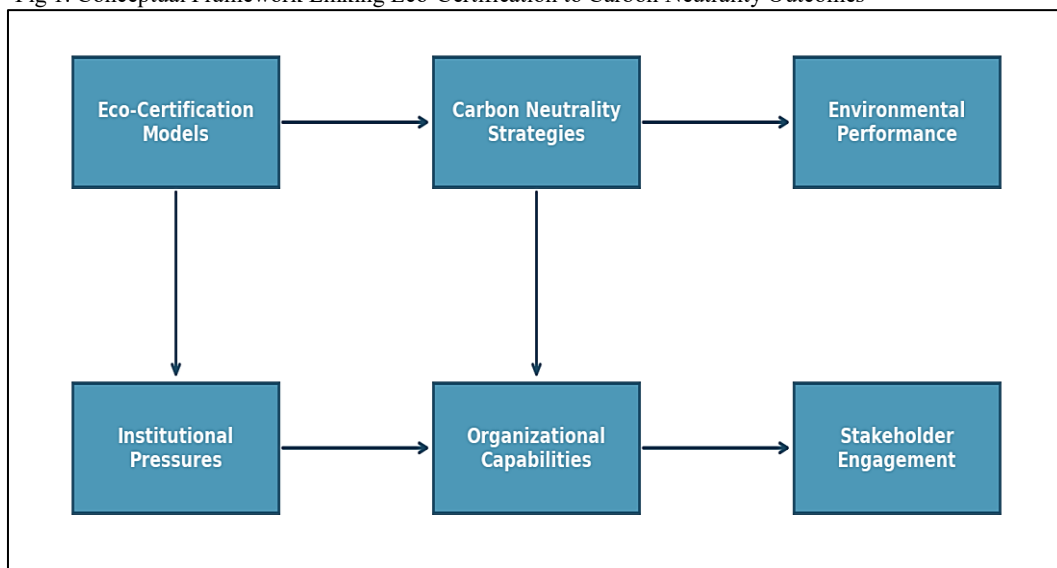
Table 1. Comparative Analysis of Eco-Certification Carbon Neutrality Provisions

Dimension	LEED	Green Globe	EarthCheck	Green Key
Energy Efficiency Target	30% reduction from baseline	20% reduction over 3 years	Annual benchmark improvement	10% reduction recommended
Renewable Energy Requirement	Mandatory on-site or procurement	Encouraged but not mandatory	Benchmarked annually	Optional criteria
Carbon Offset Policy	Permitted for residual only	Accepted as primary strategy	Permitted with verification	No specific policy
Waste Diversion Target	75% from landfill	50% minimum diversion	Progressive annual targets	30% minimum diversion
Water Conservation Target	40% reduction from baseline	25% reduction over 3 years	Annual benchmark improvement	15% reduction recommended

As Table 1 illustrates, LEED imposed the most stringent quantitative targets across all five dimensions, while Green Key operated primarily through recommended rather than mandatory thresholds. EarthCheck's benchmarking approach occupied a middle ground, requiring annual improvement without specifying fixed reduction percentages. Green Globe permitted carbon offsets as a primary compliance strategy, which several interviewees noted reduced incentives for direct emission reductions.

Figure 1 presents the conceptual framework guiding this analysis, illustrating the hypothesised relationships between eco-certification models, carbon neutrality strategies, and environmental performance outcomes, mediated by institutional pressures, organisational capabilities, and stakeholder engagement.

Fig 1. Conceptual Framework Linking Eco-Certification to Carbon Neutrality Outcomes



4.2. Regional Patterns in Carbon Neutrality Strategies

Southeast Asian properties demonstrated the strongest orientation toward renewable energy adoption. Among the eight properties surveyed in Thailand, Vietnam, and Indonesia, six had installed rooftop solar photovoltaic arrays, and three had entered power purchase agreements for off-site wind energy. A sustainability manager at a LEED-certified resort in Bali explained that government feed-in tariffs made solar investment financially attractive, noting that 'the payback period dropped from eight years to under five once the provincial subsidy was factored in.'

Latin American properties showed greater emphasis on carbon offset programmes, with five of eight properties purchasing verified emission reduction credits rather than investing in on-site renewable infrastructure. Interviewees cited grid instability and limited access to renewable energy procurement options as contributing factors. One Green Globe-certified hotel in Cancún reported that offset purchases constituted 70 percent of its reported carbon reduction, a figure that raised concerns among auditors about the permanence of claimed reductions.

Sub-Saharan African properties exhibited a distinctive pattern centred on waste reduction and water conservation, reflecting the acute resource constraints facing hospitality operators in Kenya and South Africa. Several properties had implemented greywater recycling systems and biogas digesters that converted food waste into cooking fuel, effectively addressing both waste management and energy generation. An EarthCheck-certified lodge in the Masai Mara described its biogas programme as 'born out of necessity rather than certification pressure we simply could not afford to truck in propane gas.'

Fig 2. Eco-Certification Performance Scores Across Sustainability Dimensions

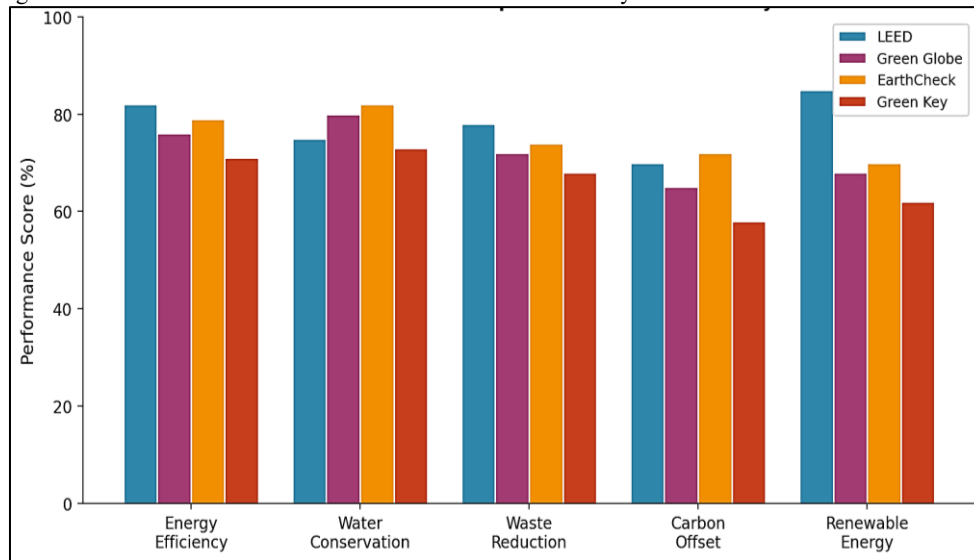


Figure 2 summarises performance scores derived from certification audit reports and sustainability disclosures across five key dimensions. LEED-certified properties achieved the highest scores in energy efficiency and renewable energy adoption, consistent with the programme's built-environment origins. EarthCheck properties led in water conservation, reflecting the programme's emphasis on resource benchmarking. The performance gap between LEED and Green Key was most pronounced in carbon offset rigour and renewable energy requirements.

4.3. Barriers to Carbon Neutrality Achievement

Table 2. Reported Barriers to Carbon Neutrality by Region and Certification Type

Barrier	Southeast Asia (n=8)	Latin America (n=8)	Sub-Saharan Africa (n=8)
High upfront capital costs	62%	88%	75%
Grid instability / unreliable energy	25%	75%	88%
Limited local technical expertise	38%	50%	75%
Weak regulatory incentives	25%	63%	50%
Guest expectations for luxury amenities	75%	63%	50%
Supply chain fragmentation	50%	75%	88%

Table 2 reveals that financial barriers were prevalent across all regions but manifested differently. Southeast Asian properties identified guest expectations as the most frequently cited barrier, reflecting the tension between maintaining luxury service standards and reducing energy-intensive amenities. Latin American and Sub-Saharan African properties faced more fundamental infrastructure challenges, with grid instability and supply chain fragmentation limiting their capacity to implement energy efficiency measures even when financial resources were available.

V. DISCUSSION

The findings of this study contribute to several ongoing debates in sustainable hospitality scholarship. First, the substantial variation in certification stringency documented here supports the argument advanced by Karlsson and Dolnicar (2016) that not all eco-labels are created equal. The gap between LEED's mandatory renewable energy provisions and Green Key's recommended targets suggests that travellers and investors should not treat certification as an undifferentiated signal of environmental performance. This has practical consequences for destination marketing organisations and procurement policies that reference 'certified' status without distinguishing among programmes.

Second, the regional patterns identified in this study complicate the assumption that certification operates uniformly across geographic contexts. Institutional theory helps explain these differences: where coercive pressures (government mandates, building codes) align with certification requirements, as in Southeast Asia, adoption tends to be deeper and more technically oriented. Where such pressures are absent, as in parts of Latin America, hotels may satisfy certification criteria through offset purchases rather than operational changes, a pattern that Chen and Tung (2014) have termed 'paper compliance.'

Third, the prominence of necessity-driven innovation in Sub-Saharan Africa challenges the assumption that sustainability in luxury hospitality is primarily a market-driven phenomenon. The biogas digesters and greywater systems observed in Kenyan and South African properties were developed in response to resource scarcity rather than certification pressure or guest demand. This finding resonates with Scheyvens and Hughes' (2019) observation that sustainability practices in developing countries often emerge from pragmatic adaptation rather than strategic positioning.

The study also raises questions about the role of carbon offsets in certification frameworks. Green Globe's acceptance of offsets as a primary compliance mechanism appeared to reduce incentives for on-site emission reductions, consistent with the moral hazard concerns raised by Gössling (2009). Properties that relied heavily on offset purchases showed lower rates of renewable energy investment and energy efficiency improvement than those certified under LEED or EarthCheck, where offsets were restricted to residual emissions after reduction measures had been exhausted.

VI. CONCLUSION AND IMPLICATIONS

This study examined how four eco-certification models shape carbon neutrality strategies among luxury hotels in emerging economies, revealing significant variation in both certification stringency and regional implementation patterns. LEED and EarthCheck emerged as more effective drivers of measurable carbon reduction, while Green Globe and Green Key's less prescriptive frameworks allowed greater reliance on offset mechanisms that may not produce lasting environmental benefits.

For hotel operators, the findings suggest that certification selection should be guided by alignment with genuine decarbonisation goals rather than marketing considerations alone. Properties seeking to achieve substantive carbon reductions may benefit from LEED or EarthCheck frameworks that mandate measurable performance improvements, even where compliance costs are higher.

For certification bodies, the study highlights the need for greater standardisation of carbon accounting requirements and stricter limitations on offset-based compliance. The Global Sustainable Tourism Council's efforts to harmonise certification standards provide a promising avenue, but the current variation among schemes risks undermining consumer trust in eco-labels as reliable indicators of environmental performance.

For policymakers in emerging economies, the regional disparities documented here underscore the importance of complementary regulatory frameworks that create enabling conditions for hotel decarbonisation. Feed-in tariffs, green building codes, and renewable energy procurement mandates were consistently associated with stronger carbon reduction outcomes, suggesting that voluntary certification alone is insufficient without supportive institutional infrastructure.

Limitations of this study include its qualitative design, which constrains generalisability, and its reliance on self-reported sustainability data that may be subject to reporting bias. Future research should employ longitudinal quantitative designs to track carbon reduction trajectories over time and across certification renewal cycles. Comparative studies examining the cost-effectiveness of different certification pathways would also address an important gap in the literature.

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