Routledge
Taylor & Francis Group

Journal of Quality Assurance in Hospitality & Tourism

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/wqah20

Identifying the Best Practices in Hotel Green Supply Chain Management Strategy: A Global Study

Yazan Khalid Abed-Allah Migdadi

To cite this article: Yazan Khalid Abed-Allah Migdadi (2022): Identifying the Best Practices in Hotel Green Supply Chain Management Strategy: A Global Study, Journal of Quality Assurance in Hospitality & Tourism, DOI: 10.1080/1528008X.2022.2065657

To link to this article: https://doi.org/10.1080/1528008X.2022.2065657

Published online: 17 Apr 2022.

JOURNAL OF QUALITY ASSURANCE IN HOSPITALITY & TOURISM
https://doi.org/10.1080/1528008X.2022.2065657

Routledge
Taylor & Francis Group

Identifying the Best Practices in Hotel Green Supply Chain Management Strategy: A Global Study

Yazan Khalid Abed-Allah Migdadi

Department of Management and Marketing, College of Business and Economics, Qatar University, Doha, Qatar

ABSTRACT

The aim of this study is to identify the best practices in hotel green supply chain management strategy by analyzing the practices of hotels from several regions. To this end, a comprehensive framework was developed to plug the gap in the literature. This framework was examined by studying a convenient and purposive sample of 47 hotels. Only top rated 4- and 5-star hotels were targeted. Data were collected from the GRI database by retrieving annual sustainability reports over the period 2017–2019. The best practices reported by this study were related to internal green process design, green quality management and internal commitment, green procurement of water/energy, and green customers' relationship management. This is one of the rare studies that reports best practices at a global level by using a comprehensive framework developed for the purpose.

KEYWORDS

Best practices; hotel; green; sustainability; supply chain management; global

Introduction

The sustainability of hospitality and hotels has become a significant determinant influencing the decision makers' decisions and customers' behavior. There is increased pressure on hotels to adopt green supply chain management as a response to customers' awareness and demand, governmental environmental regulations, community pressures, and the growing cost of supply chain operations (Al-Aomar & Hussain, 2017; Masa'deh et al., 2017; Modica et al., 2020; Singh et al., 2014).

The hotel industry is one of the intensive sectors of the tourism industry in its use of energy (Cingoski & Petrevska, 2018; Mak & Chang, 2019). In the tertiary building sector, hotel facilities are ranked among the top 5 in terms of energy consumption, releasing between 160 kg and 200 kg of CO2 per m^2 of room floor area (Hotel Energy Solutions, 2011). In addition, hotels are major water consumers (Kasim et al., 2014). Hotel water consumption per capita in developed countries is 2 or 3 times the local water demand (Tortella & Tirado, 2011). Furthermore, hotels generate a huge amount of waste, which goes to

CONTACT Yazan Khalid Abed-Allah Migdadi ymigdadi@qu.edu.qa Department of Management and Marketing, College of Business and Economics, Qatar University, Doha, Qatar

landfill (Singh et al., 2014). Accordingly, hotels are more urgently required than other organizations to adopt an environmental strategy to reduce or minimize the environmental impact of their operations on the natural environment (Mak & Chang, 2019).

Hotels that adopt green behavior reap higher benefits than hotels that do not (M.H. Chen et al., 2021). Green supply chain management is taking an important strategic role to enhance its competitive advantage in hospitality (Al-Aomar & Hussain, 2017; Cingoski & Petrevska, 2018). The adoption of green supply chain management leads to positive economic, operational, and environmental performance (Chung & Parker, 2008; Masa'deh et al., 2017).

A hotel with green practices enhances its reputation, image, and worth among customers better than other hotels do (Chandran & Bhattacharya, 2019; Cingoski & Petrevska, 2018; Gössling & Lund-Durlacher, 2021). The customers are more satisfied, loyal, and willing to pay higher prices (Modica et al., 2020). Moreover, in some regions with scarce resources, stable supplies are overwhelmingly unlikely for hotels, so sustainability or green supply chain management plays an essential role in their operation and generates more economic benefits (Kim et al., 2019). For example, by proper recycling, a hotel can earn around 23,371–24,395 dollars per year and annually reduce its emissions to equal those from 90 passengers' vehicles (Singh et al., 2014).

The tourism sector contributes to all 17 of the UN's goals for sustainable development; specifically, this sector targets directly goals 8, 12, and 14. UN's post-2015 development plans firmly positioned sustainable tourism to accomplish its agenda, calling for a clear implementation framework (United Nations World Tourism Organization, 2021). Although some leading hotel groups contribute to SDGs, more monitoring and reviewing by scholars in hospitality and tourism will be required to assess the progress of this contribution (Jones & Comfort, 2019).

Most hotel sustainability studies have recommended studying environmental management responsibility in general and resource management (e.g., water and energy) in particular (Kim et al., 2019). Despite extensive discussion of environmental management for hotels, little research has been done on managing the industry's green supply chain (M.H. Chen et al., 2021), as a new area of study in sustainability (Al-Aomar & Hussain, 2017).

What is best practice in hotel green strategy has been an issue for researchers since the late 1990s (e.g., Enz & Siguaw, 1999). The best practices in strategy will form an important research issue if the environment becomes highly changeable and dynamic (Migdadi, 2015). Tourism is one of the dynamic and far-reaching economic sectors (Ojielo, 2018). The studies of best practice in hotel green strategy in general are limited (e.g., Chandran & Bhattacharya, 2019; Chung & Parker, 2008; Enz & Siguaw, 1999; Erdogan &

Baris, 2007; Fraj et al., 2015; Singh et al., 2014) and very scarce in particular regarding best practice in hotel green supply chain management (e.g., Al-Aomar & Hussain, 2017; Sari & Suslu, 2018).

The previous studies of best practice in hotel green supply chain management strategy, as in hotel best practices in green strategy studies and hotel green supply chain management strategy studies, have not yet developed a comprehensive conceptual framework (e.g., Farsari, 2012; Schwartz et al., 2008; Xu & Gursoy, 2015b) and have not investigated in depth all the sub-processes and actions related to the upstream, midstream, and downstream dimensions of hotel supply chains (e.g., Galeazzo et al., 2021). Furthermore, few studies (e.g., Cingoski & Petrevska, 2018; Filimonau & Tochukwu, 2020; Gössling & Lund-Durlacher, 2021; Kasim et al., 2014; Singh et al., 2014) have investigated comprehensively the impact of these actions on all green indicators.

Most studies that have investigated the practices of hotel green supply chain management strategy in general and best practices in particular have confined themselves into one national context (e.g., Erdogan & Baris, 2007; Font et al., 2008; Al-Aomar & Hussain, 2017; Masa'deh et al., 2017; Parpairi, 2017; Cingoski & Petrevska, 2018; Sari & Suslu, 2018; Chandran & Bhattacharya, 2019; Mok et al., 2020; Filimonau & Tochukwu, 2020; Gössling & Lund-Durlacher, 2021).

Global level studies with an extended insight into the varied practices worldwide, which share the best practices across global regions, should receive more concern (Migdadi, 2018, 2020; Migdadi & Omari, 2019); moreover, such global studies will help better to realize the global level goals of sustainability, such as UN sustainability goals, which the countries in the world should adopt.

Accordingly, this study sets out to bridge the previous research gaps by developing a comprehensive conceptual framework and conducting an empirical investigation of the practices of hotels from a range of countries and regions. Moreover, it investigates the upstream, midstream, and downstream practices of hotel green supply chain management and their impact on all green performance indicators. To this end, it met the following objectives:

(1) Developing a comprehensive conceptual framework of best practices in hotel green supply chain management strategy.
(2) Identifying the hotels that achieved the best green performance in relation to each green indicator.
(3) Identifying the hotels' actions related to each dimension of green supply chain management strategy that achieved the best green performance.

This paper is divided into six sections. The first section is the literature review, followed by a proposed conceptual framework of the best practices in hotel green supply chain management strategy. Next comes the methodology

section, then the data analysis results and findings, followed by a discussion of the results, and finally, a section for the conclusions, implications, and recommendations for future research.

Literature review

This section includes a review of the results of previous empirical studies and what was adopted as the theory and developed conceptual frameworks of hotel green supply chain management strategy in general and best practices in particular. The aim of this review was to identify the contribution of and gaps in the current empirical and conceptual studies, in order to plug them. In addition, this section identifies the theoretical assumptions and principles adopted by the present study. This section starts by discussing the theory and conceptual frameworks of hotel green supply chain management and goes on to discuss the theory and conceptual frameworks of best practice in the hotel green supply chain management strategy.

Theory and conceptual frameworks of hotel green supply chain management strategy

The hotel green supply chain is a network of different organizations and processes engaged in delivering the components of hotels' green services and products (Cho et al., 2012; Xu & Gursoy, 2015a), extending from suppliers to hotel customers (Zhang et al., 2008), and contributing directly to the value of hotel environmental green service (Al-Aomar & Hussain, 2017; Schwartz et al., 2008). After intensive literature review, the proposed hotel green supply chain investigated by this study is the same as in Figure 1.

Different approaches explain how organizations adopted green strategies. One of these approaches classified the adoption of an environmental strategy on a continuum of their conformance to being voluntary (Sharma, 2000). Another approach classified the environmental strategies as substantive or symbolic (Hyatt & Berente, 2017). Moreover, the environmental strategy could be classified as two alternatives, namely, instrumental and awareness strategies (Heikkurinen, 2011). Accordingly, hotels adopted environmental strategies as proactive or reactive (Fraj et al., 2015) and chose to achieve the environmental and economic gains. The current study does not investigate the reasoning behind adopting green supply chain management strategy, whether proactive or reactive, but instead focuses on an awareness approach.

The conceptual frameworks adopted by previous studies identify the dimensions of hospitality or hotel's green supply chain management and the related actions that managers could take (e.g., Modica et al., 2020; Xu & Gursoy, 2015b). According to these frameworks, the dimensions of

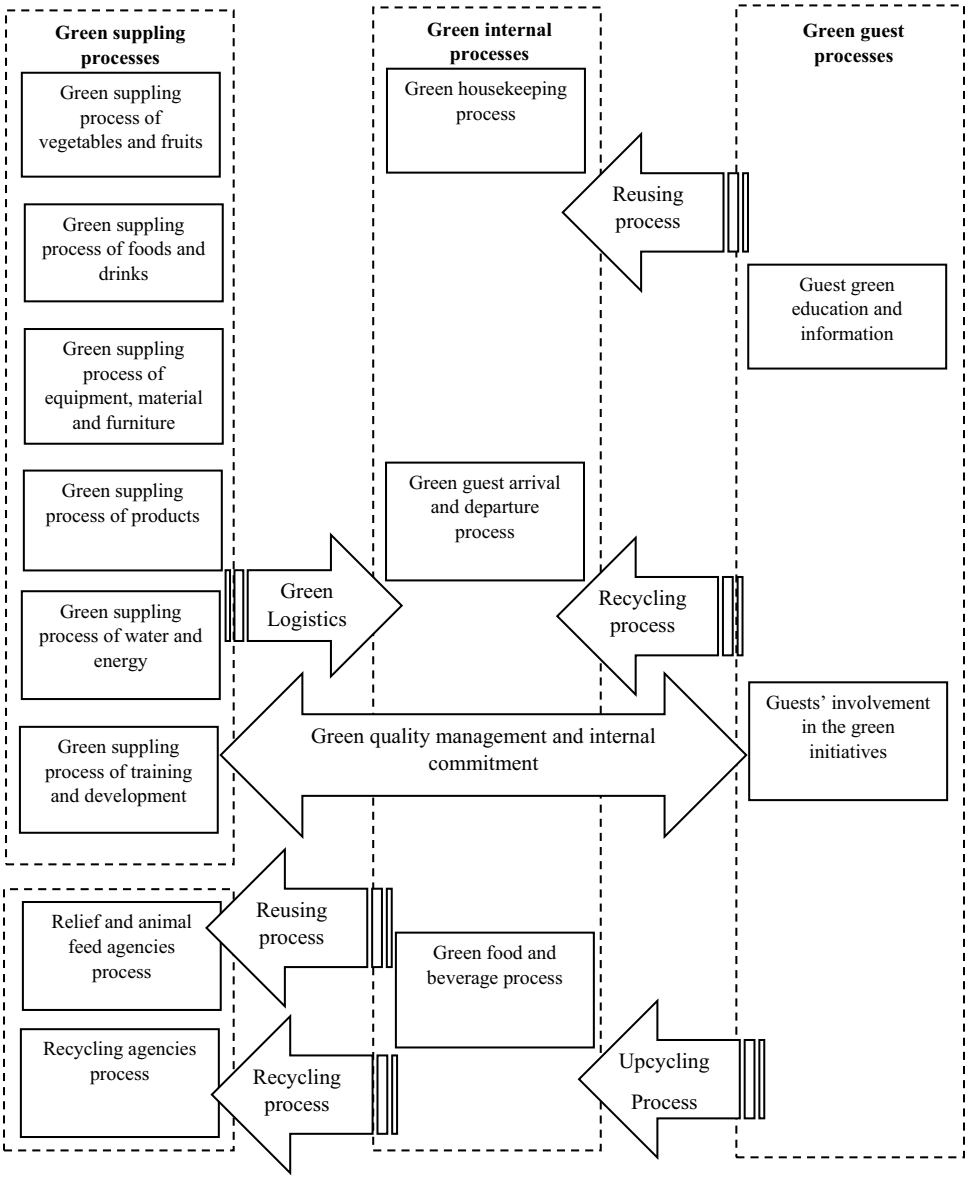

Figure 1. Hotel green supply chain dimensions and processes.
Source: adopted from Zhang et al. (2009) and Xu and Gursoy (2015b)

green supply chain management can be classified as the purchasing of greener products or green procurement (Galeazzo et al., 2021); greener service process, product management during use, product life extension, recycling, and pollution control (Modica et al., 2020); transportation (Font et al., 2008); environmental protection programs; and solid waste management (Erdogan & Baris, 2007).

Other models identify the green supply chain management actions that relate to particular green performance indicators, without checking the clear dimensions of green supply chain management (e.g., Al-Aomar & Hussain, 2017; Farsari, 2012). Other models classify the actions into two kinds: basic green practices and advanced green practices (e.g., Sari & Suslu, 2018).

A few conceptual models are concerned about the process of developing competitive sustainable supply chain management (e.g., Schwartz et al., 2008). Some empirical studies of a sustainable supply chain (e.g., Font et al., 2008; Modica et al., 2020) decided to identify the competitive advantages of hotel green supply chains (e.g., Al-Aomar & Hussain, 2017; Erdogan & Baris, 2007; Fantazy et al., 2010; M.H. Chen et al., 2021; Masa'deh et al., 2017; Sari & Suslu, 2018).

It is clear that most of these conceptual models and studies of hotel green supply chain management strategy have not investigated all dimensions of hotel green supply chain management. Most models and studies investigated a limited number of dimensions. The few models that focused on investigating the performance indicators of green supply chain management strategy have not investigated the impact of actions on the performance indicators.

Theory and conceptual frameworks of the best practices in hotel green supply chain management strategy

The best practices of strategy are defined as a stream of actions that are best for a company to adopt and that have led to the best change in performance (Laugen et al., 2005). Accordingly, the best practices of hotel green supply chain management strategy are streams of actions (Sharma, 2000) related to the dimensions of the supply chain management strategy (hotel green procurement, hotel green logistics, hotel green service design, hotel's green customers relationship management, and hotel green reverse logistics), which has led to best hotel green performance in terms of improved recycling and a reduction of GHG emissions, energy consumption, water consumption, and waste generated.

The previous studies of best practices in hotel green strategies have developed conceptual frameworks (e.g., Chung & Parker, 2008; Farsari, 2012; Kasim et al., 2014; Schwartz et al., 2008; Xu & Gursoy, 2015b), but other empirical studies have also reported hotel green best strategy dimensions and practices (e.g., Al-Aomar & Hussain, 2017; Chandran & Bhattacharya, 2019; Enz & Siguaw, 1999; Erdogan & Baris, 2007; Kim et al., 2019; Mak & Chang, 2019; Modica et al., 2020; Sari & Suslu, 2018; Singh et al., 2014). The conceptual models developed are too limited to compete with the results from empirical studies.

The conceptual and empirical studies of best practices in hotel green supply chain management strategy identify the competitive practices of such supply chain management functions as green procurement (e.g., Galeazzo et al., 2021)

and discussed certain dimensions of hotel green supply chain management strategy (e.g., Al-Aomar & Hussain, 2017; Enz & Siguaw, 1999; Farsari, 2012; Filimonau & Tochukwu, 2020; Gössling & Lund-Durlacher, 2021; Modica et al., 2020), but these are based on unclear and inconstant dimensions of the supply chain management strategy (e.g., Mak & Chang, 2019; Sari & Suslu, 2018).

Other studies have focused on developing a framework or investigating the best practices of a particular green indicator (e.g., Cingoski & Petrevska, 2018; Filimonau & Tochukwu, 2020; Gössling & Lund-Durlacher, 2021; Kasim et al., 2014; Singh et al., 2014). Some studies have reported the best practices related to green multi-indicators (Chandran & Bhattacharya, 2019). Most studies have not investigated the impact of the adopted best practices of hotel green strategies on performance (e.g., Al-Aomar & Hussain, 2017; Chandran & Bhattacharya, 2019; Cingoski & Petrevska, 2018; Mak & Chang, 2019; Modica et al., 2020; Sari & Suslu, 2018).

Most studies of best practices in hotel and hospitality green strategy have studied them more from a natural resource-based viewpoint (NRBV) (e.g., Enz & Siguaw, 1999; Chung & Parker, 2008; Kasim et al., 2014; Singh et al., 2014; Fraj et al., 2015; Al-Aomar & Hussain, 2017; Cingoski & Petrevska, 2018; Chandran & Bhattacharya, 2019) than from that of institutional theory (e.g., Mok et al., 2020. Xu & Gursoy, 2015b).

The NRBV) is derived from a resource-based viewpoint introduced by Barney (1991). This sees that the strategic resources have the greatest potential to furnish an organization with competitive advantage. Hart (1995) has extended the range of this viewpoint and proposed one based on the firm's relationship with the natural environment. This NRBV is composed of three interrelated strategic capabilities: pollution prevention, product stewardship, and sustainable development.

With its pollution prevention capability, the firm seeks to prevent emissions and waste rather than cleaning these up when they appear. However, according to product stewardship, the scope of capabilities expands to include the entire value chain of a product's lifecycle. The stakeholders' involvement is a benchmark of product stewardship: the environmental voice of stakeholders is then incorporated in the product design and development process. The last capability, sustainable development, is more expanded than product stewardship. This capability seeks to ensure indefinite development for the future, not only in relation to environmental concerns but expanded to include economic and social concerns (Hart, 1995; Hart & Dowell, 2011).

The present study adopts a NRBV, focusing mainly on product stewardship, since the concern of this study is to investigate the entire supply chain of hotels, and is concerned with examining the impact of the green supply chain management actions on the environmental performance.

It is clear that the previous studies did not develop or investigate the best practices in hotel green supply chain management strategy in depth or comprehensively. A comprehensive framework would give greater insight into the best practices in all dimensions of hotel green supply chain management and all green performance indicators. Moreover, a detailed proposed framework is required to identify the best actions related to each dimension of hotel green supply chain management and each green performance indicator; this is the first contribution of this study.

Proposed conceptual framework of best practices in hotel green supply chain management strategy

One of the main objectives and contribution of this study is the development of a comprehensive framework of best practices in hotel green supply chain management strategy. This section achieved this objective by identifying the dimensions of the hotel green supply chain management strategy along the hotel green supply chain. It also identified the green actions adopted under each dimension, with the hotel green indicators, and the best actions for showing green indicators. The next sections discuss this proposed framework in detail.

Dimensions and actions of the hotel green supply chain management strategy

Green supply chain management strategy dimensions are the functions of the hotel green supply chain management; these functions were classified into different categories by previous studies, as summarized in previous section (e.g., Erdogan & Baris, 2007; Xu & Gursoy, 2015a b; Modica et al., 2020; Galwazzo et al., 2021). The functions should all be strategic, which means that the actions taken in regard to these functions should provide hotels with environmental competitive advantage and adherence to their organizational goals (Cho et al., 2012).

This study adopts the service supply chain management dimensions proposed by Cho et al. (2012) and Zhang et al. (2008) of the sustainable supply chain management of tourism and also adopts the manufacturing green supply chain management dimensions proposed by Zhu et al. (2008). These dimensions are hotel green procurement management, hotel green logistics process design, hotel internal green processes design, hotel green quality management and internal commitment, hotel green reverse logistics, and hotel green customers relationship management. This study adopted these dimensions since they are widely shared in the literature on green supply chain management in general and hospitality in particular; moreover, these dimensions cover all the processes of hotels' green supply chain.

Table 1 shows the hotel green supply chain management strategy dimensions, sub-dimensions, and detailed actions. This table also maps the processes of the hotel green supply chain with management dimensions. The first

dimension is green procurement management, which represents the upstream green practices, namely, shifting the firm's demand to greener products as a response for the supply side and selecting suppliers who deliver in a greener way and supply more and greener products; hotels work collaboratively with the supplier to improve performance (Blome et al., 2014; Galeazzo et al., 2021). As shown in the table, there are sub-dimensions of green procurement management, i.e., green procurement management from local farms, green procurement management of food/drinks, green procurement management of equipment material and furniture, green procurement of products, green procurement management of energy/water, and green procurement management from educational institutions (Xu & Gursoy, 2015a).

The hotel's internal green process management represents the midstream green practices that translate guest (customer) requirements into actual orders. This process begins with the hotel service reservation, in the form of an appointment or admission to the hotel, and continues as long as the relationship with the guest is maintained (Cho et al., 2012). This dimension is classified into green housekeeping process management, a green procedure for managing guests' arrivals and departures, a green process for managing the production and service of food and beverages (Li & Yang, 2011), and green quality management and internal commitment (Zhang et al., 2008).

Green logistics, which means adopting environmentally friendly actions, relates to sources of materials, resources, warehousing, and transportation planning. In transportation which is one of the important aspects, the green actions are related to using efficient transportation resources, such as more sustainable vehicles, the sustainable scheduling of deliveries, consolidation of freight, and the type of fuel chosen (Ubeda et al., 2011).

Green reverse logistics management concerns the disposition activities at the end of a product's life to provide environmentally friendly outcomes such as remanufacturing, recycling, reuse, and upcycling (Hazen et al., 2011). Reuse is suitable for completely unused or little used products that can be considered new; remanufacturing is a process of reworking used items. However, recycling is also known as the recovery of material or the process of recovering any part of returned product that may contain valuable residuals (Hazen et al., 2012). Reuse is almost always conducted by hotels, relief agencies, and animal feed institutions (Al-Aomar & Hussain, 2017). Hotels remanufacture and upcycle products (Wang et al., 2018; Yasin et al., 2018), but they could recycle them as well (Al-Aomar & Hussain, 2017) as could professional recycling companies and agencies, whether governmental, non-governmental, or private (Mak & Chang, 2019).

The involvement of guest customers in the green supply chain management could be a crucial dimension in managing the green supply chain. Such involvement depends on the customers' biosphere value or concern for the

Table 1. Hotel green supply chain management strategy dimensions and actions.

HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
Hotel green procurement management	Green procurement management from local farms (PLF)	PLF1	Supply from local farms	Mak & Chang, 2019
		PLF2	Local farms/ Suppliers Audit Program	Al-Aomar & Hussain, 2017
		PLF3	Supply from organic farm to provide chemical-free products	Pumhiran, 2015
		PLF4	Supply from a farm implement aquaponics for vegetables	Mok et al., 2020
	Green procurement management of food/drink (PFD)	PFD1	Get supplies from local food producers	Björk & Kauppinen-Räisänen, 2016
		PFD2	Adopt a food/drink Suppliers Audit Program	Al-Aomar & Hussain, 2017
		PFD3	Request suppliers to eliminate excess packaging materials	Al-Aomar & Hussain, 2017
		PFD4	Order large packages of food and drinks to reduce plastic	Verghese et al., 2015
	Green procurement management of equipment materials and furniture (PEF)	PEF1	Order heat insulation materials	Goodman, 2000; Mak & Chang, 2019
		PEF2	Purchase from suppliers of green equipment, materials and furniture (e.g., office supplies, cleaning supplies)	Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		PEF3	Equipment, materials and furniture Suppliers Audit Program	Al-Aomar & Hussain, 2017
		PEF4	Use carpet squares so that only damaged areas need replacement	Al-Aomar & Hussain, 2017
		PEF5	Request suppliers to eliminate excess packaging materials	Goodman, 2000; Al-Aomar & Hussain, 2017
		PEF6	Use gas-powered equipment instead of diesel-powered	Taylor et al., 2010
	Green procurement management of products (PP)	PP1	Supply fewer disposable amenities	Goodman, 2000
		PP1	Order amenities of suitable package size to reduce waste	Goodman, 2000
HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
		PP2	Order organic amenities	Goodman, 2000; Mak & Chang, 2019
		PP3	Sign a contract with green suppliers	Mak & Chang, 2019
		PP4	Use coreless toilet paper	Goodman, 2000; Baker, 2009
		PP5	Use notepads made of recycled paper	Baker, 2009
		PP6	Use glass instead of Styrofoam	Enz & Siguaw, 1999; Goodman, 2000
		PP7	Order paper products instead of plastic	Enz & Siguaw, 1999
		PP8	Order cloth napkins instead of paper napkins	Enz & Siguaw, 1999; Goodman, 2000; Al-Aomar & Hussain, 2017

(*Continued*)

Table 1. (Continued).

HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
		PP9	Order linen napkins	Enz & Siguaw, 1999; Goodman, 2000
		PP10	Order Terry cloth washroom towels	Goodman, 2000
		PP11	Order cleaning chemicals that are nontoxic	Enz & Siguaw, 1999; Goodman, 2000
		PP12	Order recycled polyester microfiber to fill pillows	Goodman, 2000; Baker, 2009
		PP13	Adopt packaging that are biodegradable	Enz & Siguaw, 1999
		PP14	Order organic air fresheners	Lin et al., 2021
		PP15	Deliver products in environmentally friendly packaging	Goodman, 2000
		PP16	Adopt product Suppliers Audit Program	Al-Aomar & Hussain, 2017
		PP17	Request suppliers to eliminate excess packaging materials	Al-Aomar & Hussain, 2017
	Green procurement management of water/energy (PWE)	PWE1	Use rainwater harvesting systems	Mak & Chang, 2019
		PWE2	Use solar power	Baker, 2009; Al-Aomar & Hussain, 2017
		PWE3	Extract water from ground sources	Kasim et al., 2014
HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
		PWE4	Use a solar powered hot water system	W.W. Chan et al., 2013
		PWE5	Use well water	Kasim et al., 2014
		PWE6	Convert sea water to potable water	Thimmaraju et al. (2018)
	Green procurement management from educational institutions (PE)	PE1	Educate and train all levels of staff	Goodman, 2000, Mak & Chang, 2019
Hotel green logistics process design	Green logistics process management (GLP)	GLP1	Use fuel-efficient vans and vehicles	Ubeda et al., 2011; Mak & Chang, 2019
		GLP2	Use electrical vans and vehicles	Enz & Siguaw, 1999; Ubeda et al., 2011
		GLP3	Ship goods less often	Ubeda et al., 2011
		GLP4	Use shorter transportation routs	Ubeda et al., 2011
Hotel internal green process design	Green housekeeping process management (GHP)	GHP1	Wash bed sheets and towels less frequently, and when guests request it	Enz & Siguaw, 1999; Mak & Chang, 2019
		GHP2	Encourage housekeeping staff in sorting and recycling guests' garbage	Mak & Chang, 2019
		GHP3	Minimize the use of harmful substances (e.g., laundry detergent) in daily operations	Mak & Chang, 2019
		GHP4	Stop using disposable amenities such as bottled shampoo, bottled conditioner	Mak & Chang, 2019
		GHP5	Use dispensers for shower gel and shampoo instead of bottles	Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		GHP6	Use energy-/water-efficient machines (e.g., for washing laundry, vacuum cleaning, etc.)	Al-Aomar & Hussain, 2017

(*Continued*)

Table 1. (Continued).

HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
		GHP7	Supply no unrequested newspapers	Al-Aomar & Hussain, 2017
		GHP8	Reduce the laundry working hours per day by introducing machines of ideal capacity	Mak & Chang, 2019
		GHP9	Provide better quality bed linen in rooms to reduce heater use	Gössling & Lund-Durlacher, 2021
HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
	Green process of guest arrivals and departures management (GGP)	GGP1	Save water in toilets by using low-flow and dual flush toilets	Goodman, 2000; Mak & Chang, 2019
		GGP2	Adjust the flow of taps to reach the optimal level of water output by using, for example, tap aerators or adjusting tap flow	Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		GGP3	Use energy-efficient HVAC systems (e.g., heat pumps, solar panels)	Mak & Chang, 2019
		GGP4	Use energy-efficient LED lighting	Font et al., 2008; Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		GGP5	Introduce the "eco-friendly room package"	Mak & Chang, 2019
		GGP6	Adopt green building design	Mak & Chang, 2019
		GGP7	Put recycling bins in guest rooms	Mak & Chang, 2019
		GGP8	Turn off or dim lights in communal areas	Goodman, 2000
		GGP9	Use sensors in light, ventilation, heating, and cooling systems	Font et al., 2008; Al-Aomar & Hussain, 2017
		GGP10	Use battery operated club cars	Enz & Siguaw, 1999; Al-Aomar & Hussain, 2017
		GGP11	Use electric boats	Mak & Chang, 2019
		GGP12	Use a Key Card System to shut down power when guests leave a room	Al-Aomar & Hussain, 2017
		GGP13	Use energy-efficient appliances	Mak & Chang, 2019
		GGP14	Install a charging station for electrical vehicles to motivate guests with eco cars to reduce pollution	Rathnayake et al., 2020
		GGP15	Equip lifts with VVF, drive and sleep mode features	Shukla & Tambe, 2018
		GGP16	Provide transportation details for guests	Mak & Chang, 2019
HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
	Green process of producing and serving food and beverages management (GFP)	GFP1	Design new dishes using local ingredients	Mak & Chang, 2019
		GFP2	Use jet sprays for dishwashing	Venkatesh & Sivaramkumar, 2015
		GFP3	Direct kitchen workers to fully load dishwashing machines	Venkatesh & Sivaramkumar, 2015

(*Continued*)

Table 1. (Continued).

HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
		GFP4	Replace kitchen equipment with new energy-efficient and environmentally friendly items	Cingoski & Petrevska, 2018
		GFP5	Plan meals and the purchase of ingredients	Thomas-Francois et al., 2018
Hotel green quality management and internal commitment	Green Quality management system (GQM)	GQM1	Set up environmental management systems (EMS)	Mak & Chang, 2019
		GQM2	Adopt environment evaluation systems	Schwartz et al., 2008
		GQM3	Adopt ISO14001 certification	Al-Aomar & Hussain, 2017
		GQM4	Adopt EHSMS Certification	Al-Aomar & Hussain, 2017
		GQM5	Adopt LEED certification	Al-Aomar & Hussain, 2017
		GQM6	Adopt HACCP certification	Al-Aomar & Hussain, 2017
		GQM7	Adopt ISO 5001 energy management system certification	Al-Aomar & Hussain, 2017
		GQM8	Adopt ISO 14064 certification	Al-Aomar & Hussain, 2017
	Environment-controlling systems and facilities (ECS)	ECS1	Install an indoor thermostatic system to control the temperature	Enz & Siguaw, 1999; Mak & Chang, 2019
		ECS2	Modify the intensity of light according to the time and season whether by adjusting it manually or with a lighting control system	Mak & Chang, 2019
		ECS3	Increase green coverage in the hotel surroundings by planting trees	Mak & Chang, 2019
		ECS4	Implement waste-disposal practices	Filimonau & Tochukwu, 2020
HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
		ECS5	Use environmental information systems to share information	Farsari, 2012; Goodman, 2000)
		ECS6	Use an irrigation system that reduces water evaporation	Kasim et al., 2014
		ECS7	Use a central waste room	Al-Aomar & Hussain, 2017
		ECS8	Monitor the use of utilities through sub-meters	Lee & Yim, 2021
		ECS9	Audit Water to identify leakage	Brears, 2020
		ECS10	Conduct a waste audit	Al-Aomar & Hussain, 2017
		ECS11	Use smart irrigation and highly efficient irrigation spray systems	Rico et al., 2020
	Managers and staff commitment practices (MSC)	MSC1	Assign a "gardening team" to look after the plants in the hotel property	Mak & Chang, 2019
		MSC2	Formulate green goals and action plans for staff	Mak & Chang, 2019

(*Continued*)

Table 1. (Continued).

HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
		MSC3	Devise green standard operating procedures (SOPs)	Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		MSC4	Focus on a long-term green orientation (LTO) instead of a short-term profit orientation	Mak & Chang, 2019
		MSC5	Encourage the involvement of staff	Mak & Chang, 2019
		MSC6	Encourage carpooling	Enz & Siguaw, 1999
		MSC7	Make tour buses more environmentally friendly by retrofitting them	Enz & Siguaw, 1999
		MSC8	Customize reporting	Enz & Siguaw, 1999
		MSC9	Use fuel-efficient vehicles	Harris et al., 2021
		MSC10	Use electric vehicles	Enz & Siguaw, 1999
		MSC11	Use durable mugs for staff	Al-Aomar & Hussain, 2017
		MSC12	Use double sided printouts with smaller margins and fonts	Al-Aomar & Hussain, 2017
HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
	Partnership with community and participate in external programs (PCP)	PCP1	Form strategic partnerships with environmental organizations	Mak & Chang, 2019
		PCP2	Participate in environmental donation events	Mak & Chang, 2019
		PCP3	Participate in "green" competitions	Mak & Chang, 2019
		PCP4	Participate in hotel chain environmental programs	Mak & Chang, 2019
		PCP5	Work with electricity companies to conduct energy auditing	Thumann et al., 2020
		PCP6	Participate in environmental initiatives such as "Earth Hour"	Al-Aomar & Hussain, 2017
Hotel green reverse logistics management	Recycling process (RCP)	RCP1	Recycle greywater by installing a wastewater treatment plant	Font et al., 2008, Kasim et al., 2014; Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		RCP2	Recycle swimming pool water for flushing toilets	Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		RCP3	Recycle food waste as organic compost	Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		RCP4	Collect, sort and sell waste for recycling purposes	Enz & Siguaw, 1999; Goodman, 2000; Al-Aomar & Hussain, 2017; Mak & Chang, 2019
		RCP5	Use recycling bins for different kinds of waste streams	Al-Aomar & Hussain, 2017
		RCP6	Recycle air-conditioning water	Songxue & Xiping, 2014
		RCP7	Recycle garbage from the garden to make compost	Singh et al., 2014
	Reusing process (RUP)	RUP1	Reuse scrap paper	Mak & Chang, 2019
		RUP2	Reuse leftover shampoo and soap	Goodman, 2000
		RUP3	Use batteries that are rechargeable	Goodman, 2000

(*Continued*)

Table 1. (Continued).

HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
HGSCM strategy dimensions	HGSCM strategy sub-dimensions		Actions	References
		RUP4	Use special door hangers that are reusable	Enz & Siguaw, 1999
		RUP5	Trade used oil	Al-Aomar & Hussain, 2017
		RUP6	Donate leftover food, used linen, and uniforms to relief agencies	Al-Aomar & Hussain, 2017
		RUP7	Reuse garbage liners if clean	Al-Aomar & Hussain, 2017
		RUP8	Use graywater and air-conditioning water for landscaping	Al-Aomar & Hussain, 2017
		RUP9	Donate the soap collected to the needy	Al-Aomar & Hussain, 2017
		RUP10	Appoint a registered collector to handle the obsolete electronic appliances	Al-Aomar & Hussain, 2017
		RUP11	Donate food to be reused as animals feed	Al-Aomar & Hussain, 2017
		RUP12	Reuse hot water from the laundry to heat radiators	Al-Aomar & Hussain, 2017
		RUP13	Use residual heat to heat swimming pool	Cheung & Fan, 2013
	Remanufacturing and Upcycling process (RMP)	RMP1	Convert old bed linen in guest rooms into kitchen pot-holders	Enz & Siguaw, 1999
		RMP2	Convert bedspreads and curtains into crib quilts and dog blankets that are sold in the hotel gift shop	Yasin et al., 2018
		RMP3	Use torn towels as cleaning rags	J. Chen et al., 2010
		RMP4	Use glass bottles for decoration	Ling et al., 2013
		RMP5	Upcycle waste wooden pallets into new furniture	Wang et al., 2018
		RMP6	Use waste to generate energy	Chen, 2018
Hotel green customers relationship management (CRM)		CRM1	Create awareness for guests through describing the hotel's environmental initiatives via hotel website	Mak & Chang, 2019
		CRM2	Create awareness for guests through environmental cards and signs	Mak & Chang, 2019
		CRM3	Obtain information about the customers' biosphere value and commitment	Rahman & Reynolds, 2016
		CRM4	Track customers' environmental performance	Rahman & Reynolds, 2016

natural environment, their commitment to environmental issues, which is affected by the biosphere value, the customers' intention to visit, pay more for a green hotel, and sacrifice some convenience (Rahman & Reynolds, 2016).

Customer relationship management (CRM) in hotels means obtaining information about the guests, communicating relevant and timely information to them, and tracking the results (Cho et al., 2012). Accordingly, hotel green CRM means obtaining information about the customers' biosphere value and

their commitment to environmental issues, as well as communicating relevant and timely environmental information to them to improve their awareness of the guest environmental friendly practices that are expected and the tracking of their environmental performance.

Performance indicators of hotel green supply chain management strategies

Outcomes of hotel green practices should be reflected in particular green performance. This performance could be classified into dimensions, such as greenhouse gas emissions, saving energy, saving water, and reducing waste (Green Hotel Association, 2021). Previous studies of hotel green supply chain management and strategy have analyzed some or all of these performance dimensions (e.g., Al-Aomar & Hussain, 2017; Erdogan & Baris, 2007; Farsari, 2012; Font et al., 2008; Modica et al., 2020).

Greenhouse gas emissions include six types of gas: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF6; Migdadi, 2019). The emissions can be classified into direct GHG1 (Scope 1), indirect GHG2 (Scope 2), and indirect GHG3 (Scope 3). In the hotel industry, direct GHG1 comprises the emissions from the sources that are owned or controlled by the hotel, for example, the emissions from generators, boilers, LP gas use, other combustion operation on the premises, light vehicles which are operated by hotels, and vehicles used for commuting by the employees of the hotel (Abeydeera & Karunasena, 2019).

Indirect GHG2 (scope 2) is the emissions from the directly billed facilities that are owned or leased by the hotel, such as the directly billed electricity sourced by the hotel from the general electricity grid. Indirect GHG3 (scope 3) applies to the remaining indirect emissions from sources that are not owned or leased by the hotel, for example, the business travel emissions of air passengers and vehicle facilities (Abeydeera & Karunasena, 2019), the emissions of suppliers' facilities, and third-party logistics services. According to the review of sustainable reports from hotels conducted in this study, the emission indicators measured by hotels were total direct emissions, total indirect emissions of scope 2 and scope 3, and intensity of emissions that could be measured as emissions per guest room (per square foot or area unit of the room) and emissions per guest night (per night or day of a guest's occupancy). Moreover, the emissions were measured by such measurement units as Kg Co_2, metric tonnes, and tonnes of CO_2 equivalent.

Energy consumption is the power required to operate the engineering services installations of a hotel, such as heating, ventilation, and air-conditioning (HVAC), lighting, vertical transportation, hot water, and cooking, to maintain a suitable indoor built environment (thermal, indoor quality and visual, etc.) and service quality for guest and staff (Shiming & Burnett, 2002). Hotels measure energy by different indicators as the total consumption of energy per annum, energy intensity as the consumption of energy per guest,

and the consumption of energy per guest room (França et al., 2003). The measurement units adopted by hotels as noted in the hotel sustainability reports were megawatt-hour, terajoule, kilowatt hour, and gigajoule.

Water consumption is the amount of water used by each hotel guest or residence, such as the hot water used for showers and leisure, swimming pool water, potable water, and water used by the hotel for cleaning, cooking, and irrigating plants (Tortella & Tirado, 2011). Hotels adopted different indicators in measuring water consumption, such as total water consumption, and water consumption intensity in the form of water consumption per guest night and per guest room (França et al., 2003). The measurement units that were adopted are exemplified by cubic meter (m^3) of consumed water, liters, mega liters, and gallons.

The waste generated is the amount of waste generated by hotel departments and zones such as its beach, wellness area, outdoor area (park, pool, garden, golf course), kitchen, local restaurant, laundry service, furniture and stock, maintenance service, offices and administrative activities, conferences rooms, lifts and stairs, and guest rooms. The waste generated can be classified as paper, plastic, carton, wipes, diapers, garden waste, food preparation waste, metal packaging, textiles, meal remains, glass, tablecloths, towels, clothes, rags, light bulbs, ink, cartridges, batteries, and so on. Other indicators measure the waste generated as total waste generated and the intensity of waste generated by each guest and each room. Waste can be measured by the gram or the kilogram (Chaabane et al., 2018).

Recycling indicators are almost always discussed in conjunction with the waste generated indicator. Recycling is measured as the ratio of recycled waste to total generated waste (Rao et al., 2006). Some types of hotel waste can be recycled, such as organic waste, papers, plastic, metals, glasses, combustible waste, and incombustible waste (Phu et al., 2019).

This study adopts all the hotel green performance indicators discussed above, namely, reduced GHG1, GHG2, GHG3 emissions, reduced GHG emissions per guest night and room, reduced energy consumption, energy consumption per guest night and room, reduced total water consumption, reduced water consumption per guest night and room, increased recycled materials, and reduced total waste.

Identifying the best actions of hotel green supply chain management strategy

Table 2 shows the mapping of the relationship between actions and green performance indicators. This map was developed according to intensive literature review; each cell shows the reference which discussed or examined the relationships. It is important to note that the researcher developed more extended mapping between all the actions and all the green indicators

Table 2. Mapping the relationship between the actions of hotel green supply chain management strategy and the green indicators.

Action	Reducing total GHG1 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG2 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG3 emissions and CO2 emissions per guest night or per guest room	Reducing total Energy consumption and energy consumption per guest night or per guest room	Reducing total Water Consumption and water consumption per guest night or per guest room	Reducing total generated waste and and generated wastes per guest night or per guest room	Improving Recycling
PLF4						Sari & Suslu, 2018	
PFD2			Sari & Suslu, 2018				
PFD3						Singh et al., 2014	
PFD4						Chandran and Bhattacharya (2019)	
PEF2			Sari & Suslu, 2018				
PEF5						Singh et al., 2014	
PEF6	Taylor et al., 2010	Taylor et al., 2010		Taylor et al., 2010			
PP6						Enz & Siguaw, 1999	
PP7						Enz & Siguaw, 1999	Enz & Siguaw, 1999
PP8						Enz & Siguaw, 1999	
PP17						Singh et al., 2014	
PWE1					Kasim et al., 2014; Chandran & Bhattacharya, 2019		
PWE2		Al-Aomar & Hussain, 2017; Gössling & Lund-Durlacher, 2021; Gössling & Lund-Durlacher, 2021		Al-Aomar & Hussain, 2017; Gössling & Lund-Durlacher, 2021	Chandran and Bhattacharya (2019)		
PE1	Cingoski & Petrevska, 2018; Sari & Suslu, 2018; Gössling & Lund-Durlacher, 2021	Cingoski & Petrevska, 2018; Sari & Suslu, 2018; Gössling & Lund-Durlacher, 2021		Cingoski & Petrevska, 2018; Sari & Suslu, 2018; FGössling & Lund-Durlacher, 2021	Kasim et al., 2014; Sari & Suslu, 2018	Sari & Suslu, 2018; Filimonau & Tochukwu, 2020	Sari & Suslu, 2018; Filimonau & Tochukwu, 2020

(*Continued*)

Table 2. (Continued).

Action	Reducing total GHG1 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG2 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG3 emissions and CO2 emissions per guest night or per guest room	Reducing total Energy consumption and energy consumption per guest night or per guest room	Reducing total Water Consumption and water consumption per guest night or per guest room	Reducing total generated waste and and generated wastes per guest night or per guest room	Improving Recycling
GHP1					Chandran and Bhattacharya (2019)		
GHP5						Singh et al., 2014	
GHP6		Chandran and Bhattacharya (2019)		Chandran and Bhattacharya (2019)			
GHP8		Kasim et al., 2014		Kasim et al., 2014			
GGP1					Chandran and Bhattacharya (2019); Al-Aomar & Hussain, 2017		
GGP2					Al-Aomar & Hussain, 2017; Al-Aomar & Hussain, 2017		
GGP3		Chandran and Bhattacharya (2019)		Chandran and Bhattacharya (2019)			
GGP4		Al-Aomar & Hussain, 2017; Cingoski & Petrevska, 2018		Al-Aomar & Hussain, 2017; Cingoski & Petrevska, 2018; Chandran & Bhattacharya, 2019			
GGP5		Gössling & Lund-Durlacher, 2021		Gössling & Lund-Durlacher, 2021			
GGP6		Taylor et al., 2010; Gössling & Lund-Durlacher, 2021		Taylor et al., 2010; Gössling & Lund-Durlacher, 2021			

(*Continued*)

Table 2. (Continued).

Action	Reducing total GHG1 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG2 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG3 emissions and CO2 emissions per guest night or per guest room	Reducing total Energy consumption and energy consumption per guest night or per guest room	Reducing total Water Consumption and water consumption per guest night or per guest room	Reducing total generated waste and and generated wastes per guest night or per guest room	Improving Recycling
GGP7						Enz & Siguaw, 1999; Chandran & Bhattacharya, 2019Singh et al. 2014	Enz & Siguaw, 1999; Chandran & Bhattacharya, 2019Singh et al. 2014
GGP12		Cingoski & Petrevska, 2018		Cingoski & Petrevska, 2018			
GQM1	Al-Aomar & Hussain, 2017	Al-Aomar & Hussain, 2017	Al-Aomar & Hussain, 2017	Al-Aomar & Hussain, 2017	Al-Aomar & Hussain, 2017	Al-Aomar & Hussain, 2017	Al-Aomar & Hussain, 2017
GQM2						Filimonau & Tochukwu, 2020	Filimonau & Tochukwu, 2020
GQM3	Cingoski & Petrevska, 2018	Cingoski & Petrevska, 2018		Cingoski & Petrevska, 2018			
ECS1		Gössling & Lund-Durlacher, 2021		Gössling & Lund-Durlacher, 2021			
ECS6					Kasim et al., 2014		
ECS8				Chandran & Bhattacharya, 2019			
ECS9				Al-Aomar & Hussain, 2017; Kasim et al., 2014			
ECS10						Filimonau & Tochukwu, 2020	Filimonau & Tochukwu, 2020
ECS11					Kasim et al., 2014		
MSC1					Kasim et al., 2014		
MSC2						Filimonau & Tochukwu, 2020	Filimonau & Tochukwu, 2020

(*Continued*)

Table 2. (Continued).

Action	Reducing total GHG1 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG2 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG3 emissions and CO2 emissions per guest night or per guest room	Reducing total Energy consumption and energy consumption per guest night or per guest room	Reducing total Water Consumption and water consumption per guest night or per guest room	Reducing total generated waste and and generated wastes per guest night or per guest room	Improving Recycling
MSC3		Gössling & Lund-Durlacher, 2021		Gössling & Lund-Durlacher, 2021	Kasim et al., 2014		
MSC5		Gössling & Lund-Durlacher, 2021		Gössling & Lund-Durlacher, 2021	Kasim et al., 2014		
PCP1					Kasim et al., 2014		
RCP1					Al-Aomar & Hussain, 2017		
RCP3						Enz & Siguaw, 1999; Al-Aomar & Hussain, 2017; Singh et al., 2014	Enz & Siguaw, 1999; Al-Aomar & Hussain, 2017; Singh et al., 2014
RCP4						Al-Aomar & Hussain, 2017; Singh et al., 2014	Al-Aomar & Hussain, 2017; Singh et al., 2014
RCP5						Enz & Siguaw, 1999	Enz & Siguaw, 1999
RCP7						Al-Aomar & Hussain, 2017	Al-Aomar & Hussain, 2017
RUP1						Al-Aomar & Hussain, 2017	
RUP2						Al-Aomar & Hussain, 2017	
RUP6						Al-Aomar & Hussain, 2017	
RUP7						Al-Aomar & Hussain, 2017	
RUP8					Kasim et al., 2014		

(*Continued*)

Table 2. (Continued).

Action	Reducing total GHG1 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG2 emissions and CO2 emissions per guest night or per guest room	Reducing total GHG3 emissions and CO2 emissions per guest night or per guest room	Reducing total Energy consumption and energy consumption per guest night or per guest room	Reducing total Water Consumption and water consumption per guest night or per guest room	Reducing total generated waste and and generated wastes per guest night or per guest room	Improving Recycling
RUP9						Al-Aomar & Hussain, 2017	
RUP11						Al-Aomar & Hussain, 2017	
RMP1						Enz & Siguaw, 1999	
RMP2						Enz & Siguaw, 1999	
CRM1	Sari & Suslu, 2018; Gössling & Lund-Durlacher, 2021	Sari & Suslu, 2018; Gössling & Lund-Durlacher, 2021	Sari & Suslu, 2018; Gössling & Lund-Durlacher, 2021	Sari & Suslu, 2018; Gössling & Lund-Durlacher, 2021	Sari & Suslu, 2018	Sari & Suslu, 2018	Sari & Suslu, 2018
CRM2	Sari & Suslu, 2018	Sari & Suslu, 2018	Sari & Suslu, 2018	Sari & Suslu, 2018	Enz & Siguaw, 1999; Kasim et al., 2014; Sari & Suslu, 2018	Singh et al., 2014; Sari & Suslu, 2018	Singh et al., 2014; Sari & Suslu, 2018

according to the results of previous studies. The map was used to examine the impact of all the proposed actions on the green indicators. In this section, only the best actions were presented for the purpose of this study.

Table 2 shows that the best actions to be judged by the green indicators are related to all the processes along the supply chain; moreover, the adoption of some best practices depends on the partnership between hotels and other stakeholders such as customers, the community, non-governmental institutions, and suppliers. Accordingly, the NRBV is adopted by this proposed model.

Methodology and methods

This section discusses the methodology and methods adopted by this study to achieve its second and third objectives. A quantitative research methodology was adopted. Accordingly, the sample design is discussed in detail, followed by the sources of data and data collection process; then, the definition and measures of study variables are discussed, moving finally to the data analysis process and techniques.

Sample design

This study used a convenient and purposive sample; it is convenient since the cases were selected on the basis of the accessibility of the data (Cohen & Carbtree, 2006), so only the cases that disclosed the environmental performance and actions in the form of a sustainability report according to Global Reporting Initiative (GRI) standards and published its reports via the GRI database were considered. However, it also used purposive sampling, since the study seeks to identify the best practices in hotel green supply chain management strategy. Accordingly, a representative sample of the hotels in adopting such best practices was selected, based on experts' opinions (Lavrakas, 2008).

The hotels were selected according to the following criteria:

(a) The hotel performance should be rated as at least a 4-star hotel; this criterion is important since almost all 5-star hotels use most energy in absolute terms (Gössling & Lund-Durlacher, 2021); most of the higher rated hotels (4-star and 5-star) use advanced technologies and practices to control energy and their emissions (Erdogan & Baris, 2007). Investigating the practices of top rated 4- and 5-star hotels contributes significantly to fulfilling the purpose of this study; the operations of these hotels are highly significant, in the sense that if the green operational performance is significant, this will reflect significant green practice.

Table 3. Study sample.

Regions	Total number of hotels	5-star hotels	4-star hotels
Asia	22	17	5
Europe	10	7	3
North America	9	7	2
South America	4	1	3
Africa	2	– -	2
Total	47	32	15

(b) The reported green practices should be extended over the period 2017–2019. GRI developed new standards of reporting sustainability and published reports via its website in 2016 (GRI, 2018a). Accordingly, the time series after adopting the new standards should begin at the end of 2017. However, the end of 2019 was chosen to be the last year in the time series, since it is the most recent year of normal hotel operation before the COVID-19 pandemic.

The initial sample was 72 hotels. After applying the previous two criteria, the number of hotels included in this study was reduced to 47 hotels distributed over several regions, as presented in Table 3.

Sources of data and the data collection process

The source of study data was the annual sustainability reports published via the GRI database. This database was chosen as a source of data because the organization developed standards of reporting sustainability practices according to the best practice standards. Moreover, GRI considered the reliability and accuracy of data in its standards of reporting. This is clearly articulated in standard 1.9. on page 15 (GRI, 2018a). Additionally, the disclosure guidelines clearly emphasize the reliability and accuracy of data (GRI, 2018b). The performances of the first and last years were collected for each case. The actions taken by the cases over the period were summarized. The data were summarized on a Microsoft Excel sheet, in order to conduct further analysis and elaboration.

Study variables

The variables of this study are classified as independent and dependent. The independent variables are the actions dictated by the hotel green supply chain management strategy, which are listed in the conceptual framework section. The dependent variables are the green performance indicators. These are total direct GHG1, indirect GHG2, indirect GHG3, intensity of CO2 emissions per guest room and per guest night, total energy consumed, and intensity of energy per guest room and per guest night, total water consumption, the total waste generated, and the ratio of recycled waste.

The actions scale was nominal (action taken: 1, not taken: 0); however, the performance indicator was a ratio (% of change in performance over the study period). The percentage of change in performance indicators was measured as follows: % of change in green performance = ((performance of 2019-performance of 2017)/performance of 2017)*100%

Data analysis

Data analysis went through two stages.

Stage 1: identifying the cases achieving the best green performance, for which K-means clustering analysis was used. This analysis was used for each green indicator, since not all indicators were adopted by all cases. For the purpose of this analysis, an artificial variable that was the same as the performance indicator variable was used to generate the clusters; this generated a cluster with only the targeted variable, since the artificial variable was a constant for all individuals (Boiroju, 2015). All the clustering trials were generated until the best performance was reached and a group of hotels was identified as achieving the best relative percentage of change in green performance.

Stage 2: identifying the actions dictated by the hotel green supply management strategy that achieved the best green performance. To this end, the Eta analysis method was used, since the independent variable which is actions is a categorical variable, while the dependent variable is typically a ratio variable. In addition, the data were non-linear and asymmetric. The Eta coefficient result identified the strength of association between the actions and hotel green indicators (SAGE, 2019). The recognized Eta coefficient value is affected by the study context; accordingly, more restricted Eta coefficients were recognized as significant, since this study was looking to identify the best practices (Kozak, 2009). The actions that had strong (η above 0.6–0.8) and very strong (η above 0.8–1.0) associations with green indicators were reported as the best actions for the purpose of this research (LaMorte, 2021). Moreover, the amount of variance in the green indicator as a consequence of change in action was identified by computing Eta squared (η^2; SAGE, 2019).

Data analysis and findings

This section is divided into five subsections. The first section identifies the hotels achieving the best green performance indicators. The following four sections identify the significant actions taken by hotels to achieve the green indicators. The data analysis technique adopted by the first section was K-means clustering analysis, but the significant actions were identified by using Eta coefficient analysis. The results of this section fulfill the second and third objectives of the study.

Identifying the hotels that achieved the best green performance indicators

Table 4 shows the results of the K-means clustering analysis. This table identifies the hotels that achieved the best green performance related to each green indicator. The best hotel achieved −9% reduction in total direct GHG1 emissions and GHG2 emissions. However, the best hotels achieved a −21% reduction in CO2 emissions per guest room and −9.1% in CO2 emission per guest night. The best hotels achieved a −6% reduction in total energy consumption, −6% in energy per guest room, and −8% per guest night. The best hotels achieved an −8% reduction in total water consumption, −17% reduction in water consumption per guest room, and −13% per guest night. The best hotels achieved a +47% increase in recycling and −2% reduction in total generated waste.

Best practices in hotel green supply chain management strategy in reducing greenhouse gas emissions

Table 5 shows the best practices in hotel green supply chain management strategy in reducing hotel GHG emissions. It can be seen that the best practices in reducing total GHG1 emissions are related to internal processes (pertaining to green procedures in managing guest arrivals and departures) and green quality management and internal commitment (managers and staff green

Table 4. K-means clustering analysis results.

Green performance dimension	Green indicator	Cluster 1 Mean center	Custer 2 Mean center	Cluster 3 Mean center	ANOVA F- value P-value
GHG Emissions	% of change in total direct GHG emissions: scope 1	**−9%** N = 12	+19% N = 15	- - - -	7.58* 0.015
	% of change in total indirect GHG emissions: Scope 2	+4% N = 14	+17% N = 12	**−9%** N = 6	50.31** 0.000
	% of change in CO2 emissions per guest room	−1% N = 14	**−21%** N = 8	- - - -	15.62** 0.003
	% of change in CO2 emissions per guest night	**−9.1%** N = 13	+0.03% N = 17	- - - -	10.39* 0.013
Energy consumption	% of change in total energy consumption	+31% N = 12	**−6%** N = 12	+7% N = 7	117.86** 0.000
	% of change in energy per guest room	**−6%** N = 6	+2% N = 14	- - - -	13.44** 0.006
	% of change in energy per guest night	**−8%** N = 9	+39% N = 11	- - - -	26.65** 0.001
Water consumption	% of change in total water consumption	+43% N = 12	+3% N = 12	**−8%** N = 6	143.701** 0.003
	% of change in water consumption per guest night	+2% N = 10	**−13%** N = 4	- - - -	13.282** 0.003
	% of change in water consumption per guest room	**−17%** N = 9	+11% N = 1	−3% N = 6	16.208** 0.004
Recycling of wastes	% of change in recycling	+3% N = 10	**+47%** N = 4	- - - -	26.47** 0.001
Wastes generated	% of change in total waste generated	**−2%** N = 6	+14% N = 13	- - - -	14.464** 0.007

*p-value≤ 0.05
**p-value ≤0.01

Table 5. Best practices in hotel supply chain management strategy in reducing greenhouse gas emissions (Eta Coefficient analysis result).

HGSCM strategy sub-dimensions	HGSCM actions	% of Reduction in total direct GHG1 emissions		% of Reduction in total indirect GHG2 emissions		% of Reduction in CO2 emissions per guest room		% of Reduction in CO2 emissions per guest night	
		η	η^2	η	η^2	η	η^2	η	η^2
Green procurement of water/energy (PWE)	PWE2					0.64 (S)	0.41		
Green housekeeping process management (GHP)	GHP6					0.685 (S)	0.47		
Green process of guest arrivals and departures management (GGP)	GGP16	0.90 (VS)	0.81						
	GGP6							0.723 (S)	0.54
	GGP12			0.636 (S)	0.41				
	GGP15					0.841 (VS)	0.71		
Environment-controlling systems and facilities (ECS)	ECS1			0.638 (S)	0.41				
	ECS2			0.638 (S)	0.41	0.841 (VS)	0.71		
	ECS8			0.834 (VS)	0.70				
Managers and staff commitment practices (MSC)	MSC6	0.898 (VS)	0.81						
	MSC7	0.898 (VS)	0.81						
Partnership with community and participation in external programs (PCP)	PCP1							0.678 (S)	0.46
Reusing process (RUP)	RUP12			0.638 (S)	0.41	0.841 (VS)	0.71		
Green customers relationship management (CRM)	CRM1							0.701 (S)	0.49

η: Eta Coefficient, strength of association between HGSCM action and the green indicator
η^2: the ratio of variance in a green indicator explained by the HGSCM action
S: Strong association (η above 0.6 to 0.8)
VS: Very strong association (η above 0.8 to 1.0)
HGSCM: Hotel Green Supply Chain Management

commitment practices). Three actions were taken, all of them according to Eta coefficient values, which are very strongly associated with reducing total GHG1 emissions. These actions were, providing guests with transportation details (GGP16), encouraging staff to use carpooling (MSC6), and retrofitting guests' tour buses to make them more environmentally friendly (MSC7).

The best practices in reducing total GHG2 emissions were related to internal procedures (guest green arrivals/departures), green quality management and internal commitment (environmental-controlling systems and facilities), and green reverse logistics (reusing procedures). Only one action was very strongly associated with reducing total GHG2 emissions; the monitoring of utilities use with sub-meters (ECS8). The strongly associated actions were the use of a Key Card System to shut down power when guests leave a room (GGP12), the use of indoor thermostatic temperature control systems (ECS1),

adjusting light intensity to suit time and season (ECS2), and reusing laundry hot water to heat radiators (RUP12). No significant action was taken to reduce GHG3 emissions.

Different combinations of best actions achieved CO2 intensity indicators (CO2 per guest night and room). The significant actions in reducing CO2 emissions per guest room were related to the green procurement of water/energy, internal processes (green housekeeping processes and green guest arrival and departure procedures), green quality management and internal commitment (green environment-controlling systems and facilities), and reverse logistics (reusing process). The actions that were very strongly associated with reducing CO2 emissions per guest room were equipping lifts with variable voltage frequency (VVF), drive and sleep mode features (GGP15), modifying the intensity of light to suit time and season (ECS2), and reusing laundry hot water to heat radiators (RUP12). However, strongly associated action consisted of using solar power instead of fuel (PWE2) and using energy-efficient machines (GHP6).

The significant actions in reducing CO2 emissions per guest night were related to internal processes (green guest arrival and departure procedures), green quality management and internal commitment (partnership with community and participation in external programs), and managing green customer relationships. All actions were strongly associated with reducing CO2 emissions per guest night. These were: adopting green building design (GGP6), forming strategic partnerships with environmental organizations (PCP1), and creating awareness for guests through descriptions of hotels' environmental initiatives via the hotel website (CRM1).

Best practices in hotel green supply chain management strategy in reducing energy consumption

Table 6 shows the best practices in hotel green supply chain management strategy in reducing energy consumption. It can be seen that the best practices in reducing total energy consumption were the green procurement of energy and green quality management and internal commitment (environment-controlling systems and facilities). Two actions were strongly associated with reducing energy, namely, using a solar powered hot water system (PWE4) and monitoring the use of utilities with sub-meters (ECS8).

The achieving of intensity indicators (reducing energy per guest room and night) was affected by various combinations of actions. Reducing energy per guest room was achieved by best actions in an internal green process design (green procedures for managing guests' arrivals and departures) and green quality management and internal commitment (environment-controlling systems and facilities, partnership with the community, and participation in external programs). One action was very strongly associated with reducing

Table 6. Best practices in hotel green supply chain management strategy in reducing energy consumption (Eta Coefficient analysis result).

HGSCM strategy sub-dimensions	HGSCM actions	% of Reduction in total energy consumption		% of Reduction in energy consumption per guest room		% of Reduction in energy per guest night	
		η	η^2	η	η^2	η	η^2
Green procurement of water/energy (PWE)	PWE4	0.64 (S)	0.41			0.813 (VS)	0.66
Green procedures for managing guests' arrivals and departures (GGP)	GGP4			0.657 (S)	0.43		
	GGP9					0.647 (S)	0.42
	GGP13			0.861 (VS)	0.74	0.639 (S)	0.44
Environment-controlling systems and facilities (ECS)	ECS8	0.643 (S)	0.41				
	ECS5			0.758 (S)	0.57		
Managers and staff commitment practices (MSC)	MSC5					0.806 (VS)	0.44
Partnership with community and participation in external programs (PCP)	PCP1			0.742 (S)	0.56		
Green customers relationship management (CRM)	CRM1					0.639 (S)	0.41

η: Eta Coefficient, strength of association between HGSCM action and the green indicator
η^2: the ratio of variance in a green indicator explained by the HGSCM action
S: Strong association (η above 0.6 to 0.8)
VS: Very strong association (η above 0.8 to 1.0)
HGSCM: Hotel Green Supply Chain Management

energy per guest room, namely, using energy-efficient appliances (GGP13). However, the remaining actions were strongly associated: using energy-efficient lighting (e.g., LED) (GGP4), using environmental information systems that allow information sharing (ECS5), and forming strategic partnerships with environmental organizations (PCP1).

Reducing energy per guest night was achieved by the best actions belonging to the green procurement of energy, internal green process design (green procedures for managing guests' arrivals and departures), green quality management and internal commitment (managers and staff commitment practices), and green customers relationship management. Two actions were very strongly associated with reducing energy per guest night, namely, using a solar powered hot water system (PWE4) and providing incentives to encourage staff involvement in green practices (MSC5). However, some other actions were also strongly associated: using sensors for lights and ventilation, heating and cooling systems (GGP9), using efficient energy appliances (GGP13), and creating awareness for guests through descriptions of hotel environmental initiatives via the hotel website (CRM1).

Best practices in hotel green supply chain management strategy in reducing water consumption

Table 7 shows the best practices in hotel green supply chain management strategy in reducing water consumption. It can be seen that the best practices in this regard were related to internal process design (green housekeeping process management) and green quality management and internal commitment (green quality management system and environment-controlling systems and facilities). All the actions were very strongly associated with reducing total energy consumption and consisted of using energy-/water-efficient machines (GHP6), reducing the laundry working hours per day by introducing machines of ideal capacity (GHP8), using environment evaluation systems (GQM2), and water auditing to identify leakage (ECS9).

The water intensity indicator (water consumption per guest night) was achieved by the best actions to ensure green procurement of water, internal green process design (green housekeeping process management and green procedures for guest arrivals and departures), green quality management and

Table 7. Best practices in hotel green supply chain management strategy in reducing water consumption (Eta Coefficient analysis result).

HGSCM strategy sub-dimension	HGSCM actions	% of Reduction in total water consumption		% of Reduction in water consumption per guest night	
		η	η^2	η	η^2
Green procurement of water/energy (PWE)	PWE1			0.642 (S)	0.41
Green housekeeping process management (GHP)	GHP6	0.983 (VS)	0.97	0.642 (S)	0.41
	GHP8	0.983 (VS)	0.97		
Green procedure for managing guest arrivals and departures (GGP)	GGP1			0.985 (VS)	0.92
	GGP2			0.642 (S)	0.41
Green Quality management system (GQM)	GQM2	0.983 (VS)	0.97		
Environment-controlling systems and facilities (ECS)	ECS9	0.983 (VS)	0.97		
	ECS8			0.985 (VS)	0.97
	ECS11			0.985 (VS)	0.97
Partnerships with the community and participation in external programs (PCP)	PCP1			0.642 (S)	0.41
Reusing process (RUP)	RUP8			0.642 (S)	0.41
Green customers relationship management (CRM)	CRM2			0.985 (VS)	0.97

η: Eta Coefficient, strength of association between HGSCM action and the green indicator
η^2: the ratio of variance in a green indicator explained by the HGSCM action
S: Strong association (η above 0.6 to 0.8)
VS: Very strong association (η above 0.8 to 1.0)
HGSCM: Hotel Green Supply Chain Management

internal commitment (environment-controlling systems and facilities, partnership with community, and participate in external programs), reverse logistics process (reusing process), and managing green customer relations.
Four actions were very strongly associated with reducing water consumption per guest night, namely, saving the water used in toilets by using low-flow toilets and dual flush toilets (GGP1), monitoring of utilities use through using sub-meters (ECS8), installing smart irrigation and a highly efficient irrigation spray system (ECS11), and creating awareness for guests through environmental place cards/signs (CRM2). However, the remaining actions were also strongly associated, such as using rainwater harvesting systems (PWE1), using water-efficient machines (GHP6), adjusting the flow of taps to reach an optimal level of water output by adjusting, for example, the tap flow or using a tap aerator (GGP2), forming strategic partnerships with environmental organizations (PCP1) and using graywater and air-conditioning water for landscaping (RUP8)

Best practices in hotel green supply chain management strategy in reducing wastes

Table 8 shows the best practices in hotel green supply chain management strategy in reducing waste. It can be seen that the best practices in reducing total waste consumption were related to green reverse logistics (recycling and reusing) and green customers relationship management. Two of the actions taken were very strongly associated with this reduction in total waste, that is to say, donating food to be reused as animal food (RUP11) and creating awareness through environmental place cards/signs in guest rooms (CRM2). The remaining two actions were strongly associated with reducing waste; these were to collect and sell sorted waste for recycling purposes (RCP4) and trade used oil (RUP5).

Table 8. Best practices in hotel green supply chain management strategy in reducing wastes (Eta Coefficient analysis result).

HGSCM strategy sub-dimensions	HGSCM actions	% of Reduction in total wastes	
		η	η^2
Recycling process (RCP)	RCP4	0.635 (S)	0.40
Reusing process (RUP)	RUP11	0.876 (VS)	0.75
	RUP5	0.635 (S)	0.40
Green customers relationship management (CRM)	CRM2	0.835 (VS)	0.70

η: Eta Coefficient, strength of association between HGSCM action and the green indicator
η^2: the ratio of variance in a green indicator explained by the HGSCM action
S: Strong association (η above 0.6 to 0.8)
VS: Very strong association (η above 0.8 to 1.0)
HGSCM: Hotel Green Supply Chain Management

Discussion

Most best practices reported by this study turn out to be related to internal green process design. The sub-processes shared between green indicators are as follows: green procedures for managing guest arrivals and departures, environmental-controlling system facilities, partnership with the community, and participation in external programs. The management of these sub-processes was shared across GHG emissions and energy and water management. Moreover, only one dimension of procurement management was adopted and shared across green performance dimensions, which was the green procurement of water/energy. This management dimension was shared across GHG emissions and energy and water management. Finally, the management of green customer relationships was shared across all green performance dimensions.

The focus on best practices in internal processes is justified, since a hotel's internal processes generate the most emissions (Hotel Energy Solutions, 2011) and engage most energy (Cingoski & Petrevska, 2018; Mak & Chang, 2019) and water consumption processes (Kasim et al., 2014). Hence, the hotel should be more concerned about it than about other dimensions of the hotel's green supply chain management strategy. Moreover, these processes are more under the control of the hotel than other processes, such as green procurement and logistics.

The concern about the green procurement of water and energy rather than other green procurement processes is related to the fact that the hotel industry is one of the most energy-intensive sectors of the tourism industry (Cingoski & Petrevska, 2018; Mak & Chang, 2019). In the tertiary building sector, hotels rank among the top 5 in energy consumption and release between 160 and 200 kg of CO2 per m^2 of room floor area (Hotel Energy Solutions, 2011). In addition, hotels are major water consumers (Kasim et al., 2014). Hotel water consumption per capita is 2 or 3 times the local water demand in developed countries (Tortella & Tirado, 2011).

The concern about managing a green customer's relationship across all green performance dimensions is supported by previous studies; the customer's awareness ought to be improved through providing customers with more tips and information about more environmentally friendly practices that guests can adopt (Enz & Siguaw, 1999). This will lead to customer concern about green sustainability and willingness to pay for sustainable initiatives (Font et al., 2008).

Guests in the hotel tend to use, for example, more water when they stay there than they do in the home (Kasim et al., 2014). Environmental awareness is the first and most important step in improving environmental protection. The low level of public environmental awareness is due to management's reluctance to compromise the comfort of hotel guests (Filimonau &

Tochukwu, 2020); they do not feel comfortable asking guests to participate in such hotel environment practices as recycling, fearing that the guests may feel offended. However, this fear seems unfounded, for these reminders in fact made guests feel part of the sustainability movement (Singh et al., 2014).

Managing guests' arrivals and departures is one of the shared internal process management sub-dimensions. This process is the core service of the hotel, which is the reason behind the hotel's existence (Li & Yang, 2011), so it is the main concern of hoteliers across most green performance dimensions (GHG emissions, energy, and water). Environment-controlling systems and facilities are also shared across the green environmental performance dimensions; this indicates the importance of using technology in the hotels. The recent importance of environmental technologies for hotels resonates as the environmental technologies have become more mature and offer more help to hotel operations, which leads to better performance than human efforts do (E. S. Chan et al., 2017).

Partnership with the community and participating in external programs will help hotels to enhance their environmental performance. Some community institutions could help hotels to measure their carbon footprint according to UN protocols; they could enhance the hotel employees' awareness of the impact of the hotels on the environment to make them more committed to protecting the environment through their daily actions and could help in preparing and carrying out related training courses (Graci & Dodds, 2008).

The results of this study confirm that the best practices are related to the various processes and management dimensions of the green supply chain, such as the green procurement of water and energy, green housekeeping process management, green CRM, and so on. Moreover, the adoption of most practices depends on the partnership with external stakeholders, such as suppliers, community institutions, relief and animal feeding agencies, and recycling agencies. Accordingly, the results of this study confirm the capability dimension of the product stewardship strategy of the NRBV.

This study demonstrated that each green indicator under each green performance dimension was affected by different combinations of green supply chain management actions. This indicates that the managers should identify the specific green indicators that they are looking to achieve and take suitable actions. Almost all actions work effectively across all indicators of the same green category.

Any difference related to the indicators themselves, for example, the intensity of performance, is measured as per guest night and room, which is more helpful and accurate than a total. A hotel may achieve a good aggregate level performance (total) by a particular action, but it deteriorates per guest or per room, as a result of the fluctuation of operations. For example, a hotel may have 100 occupied rooms emitting a lower total

GHG than it would with 150 occupied rooms. However, the GHG emissions per room of 100 occupied could be higher than 150, since the emissions are divided between actual occupied rooms or the guests who used these rooms, so this could be a significant reason behind the differences in the significance of green actions. At the same time, this result shed light on the fact that hotel managers should adopt multi-indicators to measure a particular green performance dimension with better feedback about the impact of the green actions taken.

Some best actions reported by this study were shared by previous studies but other actions emerged in this study, which previous studies have not reported. The shared actions confirm the acceptance of these actions as worldwide best practices. The emergence of new actions could be related to many factors in the study context itself. First, this study is more comprehensive than previous studies in terms of green indicators assessed and green actions analyzed. The performance indicators cover widely adopted indicators in the hotel industry, and the actions are more detailed and cover all dimensions of hotel green supply chain management, while investigating the practices of hotels from different countries.

Conclusion

This is one of the very few studies to have investigated the best practice in hotel green supply chain management strategy. A similar comprehensive conceptual framework has rarely been developed; it has identified all the dimensions of hotel green supply chain management strategy, green performance dimensions, all the actions related to these dimensions, and the best actions in achieving green performance indicators.

The conceptual framework was examined through conducting a global study, which investigated the practices of a convenient and purposive sample of hotels in Asia, Europe, North America, South America, and Africa. The data of this study were retrieved from the GRI database over an extended period, 2017–2019. The data were analyzed by using K-means clustering analysis and from Eta-analysis.

The best practices reported by this study are related to internal green process design (green procedures for guest arrivals and departures) and green quality management and internal commitment (environment-controlling system facilities, partnership with community, and energy and water management). Only one dimension of procurement management was adopted and shared across green performance dimensions, namely, the green procurement of water/energy. Finally, the green customers' relationship management was shared across all green performance dimensions.

Implications, limitations, and suggested future research

This study provides academics with a comprehensive framework, which could be adopted by scholars for research and teaching purposes. This conceptual framework includes two general dimensions: first, the green supply chain management strategy dimensions (functions) and, second, the green performance of hotel green supply chain management. These two dimensions are linked through actions taken by the hotel, which achieve the best green performance.

This conceptual framework includes seven strategy patterns of best practices in hotel green supply chain management. These strategies are the best at reducing direct GHG1 emission, best at reducing indirect GHG2 emission, best at reducing indirect GHG3 emission, best at reducing energy consumption, best at reducing water consumption, best at reducing waste, and best at recycling.

The framework could be used by hoteliers to understand the actions that could be taken to achieve the green indicators; moreover, the results of this study could be adopted by hotel managers to yield better green performance, since they now have a clearer idea about the impact of each best action on green performance indicators.

Despite the significance of this study in comparison with previous studies, it has some limitations. The first limitation is the sample size, which was limited, so it is recommended to conduct a global study in the future with a larger sample size. In addition, this study did not examine the mediating relationship between the variables, which is recommended for future researchers. Furthermore, some indicators were not found in sustainability reports such as the amount of waste per guest night and room, which could be established by future research.

Acknowledgments

Open Access funding provided by the Qatar National Library.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Yazan Khalid Abed-Allah Migdadi http://orcid.org/0000-0001-5687-5410

References

Abeydeera, L. H. U. W., & Karunasena, G. (2019). Greenhouse gas emission reporting mechanism for hotel industry-A case of Sri Lanka. *International Journal of Environmental Sciences & Natural Resources*, *20*(4), 111–118. https://doi.org/10.19080/IJESNR.2019.20.556042

Al-Aomar, R., & Hussain, M. (2017). An assessment of green practices in a hotel supply chain: A study of UAE hotels. *Journal of Hospitality and Tourism Management*, *32*(1), 71–81. https://doi.org/10.1016/j.jhtm.2017.04.002

Baker, C. (2009). Marriott thinks green for its supply chain. *H & MM*, *1*, 8.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Björk, P., & Kauppinen-Räisänen, H. (2016). Local food: A source for destination attraction. *International Journal of Contemporary Hospitality Management*, *28*(1), 177–194. https://doi.org/10.1108/IJCHM-05-2014-0214

Blome, C., Hollos, D., & Paulraj, A. (2014). Green procurement and green supplier development: Antecedents and effects on supplier performance. *International Journal of Production Research*, *52*(1), 32–49. https://doi.org/10.1080/00207543.2013.825748

Boiroju, N. K., (2015, January 2). *How can cluster the single variable data?* Research Gate. Retrieved July 28, 2021, from https://www.researchgate.net/post/How_can_I_cluster_the_single_variable_data

Brears, R. C. (2020). Developing the circular water economy: Reduce. In *Developing the Circular Water Economy* (pp. 45–64). Our Future Water, Christchurch, New Zealand: Palgrave Pivot.

Chaabane, W., Nassour, A., & Nelles, M. (2018). Solid waste management key indicator development for hotels: A Tunisian case study analysis. *Recycling*, *3*(4), 56–74. https://doi.org/10.3390/recycling3040056

Chan, W. W., Li, D., Mak, B., & Liu, L. (2013). Evaluating the application of solar energy for hot water provision: An action research of independent hotel. *International Journal of Hospitality Management*, *33*(1), 76–84. https://doi.org/10.1016/j.ijhm.2013.01.008

Chan, E. S., Okumus, F., & Chan, W. (2017). The applications of environmental technologies in hotels. *Journal of Hospitality Marketing & Management*, *26*(1), 23–47. https://doi.org/10.1080/19368623.2016.1176975

Chandran, C., & Bhattacharya, P. (2019). Hotel's best practices as strategic drivers for environmental sustainability and green marketing. *Journal of Global Scholars of Marketing Science*, *29*(2), 218–233. https://doi.org/10.1080/21639159.2019.1577156

Chen, Y. C. (2018). Evaluating greenhouse gas emissions and energy recovery from municipal and industrial solid waste using waste-to-energy technology. *Journal of Cleaner Production*, *192*(1), 262–269. https://doi.org/10.1016/j.jclepro.2018.04.260 .

Chen, J., Sloan, P., & Legrand, W. (2010). *Sustainability in the hospitality industry*. Routledge.

Chen, M. H., Wei, H., Wei, M., Huang, H., & Su, C. H. J. (2021). Modeling a green supply chain in the hotel industry: An evolutionary game theory approach. *International Journal of Hospitality Management*, *92*(1), 102716–102727. https://doi.org/10.1016/j.ijhm.2020.102716

Cheung, M., & Fan, J. (2013). Carbon reduction in a high-density city: A case study of Langham Place Hotel Mongkok Hong Kong. *Renewable Energy*, *50*(1), 433–440. https://doi.org/10.1016/j.renene.2012.06.060

Cho, D. W., Lee, Y. H., Ahn, S. H., & Hwang, M. K. 2012. A framework for measuring the performance of service supply chain management. *62*(3), 801–818, *Computers & Industrial Engineering* https://doi.org/10.1016/j.cie.2011.11.014

Chung, L. H., & Parker, L. D. (2008). Integrating hotel environmental strategies with management control: A structuration approach. *Business Strategy and the Environment*, *17*(4), 272–286. https://doi.org/10.1002/bse.546

Cingoski, V., & Petrevska, B. (2018). Making hotels more energy efficient: The managerial perception. *Economic research-Ekonomska istraživanja*, *31*(1), 87–101. https://doi.org/10.1080/1331677X.2017.1421994

Cohen, D., & Carbtree, B. (2006, July 1). *Qualitative research guidelines project, convenience sample*. Robert Wood Johnson Foundation. Retrieved December 22, 2021. from http://qualres.org/HomeConv-3802.html

Enz, C. A., & Siguaw, J. A. (1999). Best hotel environmental practices. *Cornell Hotel and Restaurant Administration Quarterly*, *40*(5), 72–77. https://doi.org/10.1177/001088049904000511

Erdogan, N., & Baris, E. (2007). Environmental protection programs and conservation practices of hotels in Ankara, Turkey. *Tourism Management*, *28*(2), 604–614. https://doi.org/10.1016/j.tourman.2006.07.003

Fantazy, K. A., Kumar, V., & Kumar, U. (2010). Supply management practices and performance in the Canadian hospitality industry. *International Journal of Hospitality Management*, *29*(4), 685–693. https://doi.org/10.1016/j.ijhm.2010.02.001

Farsari, I. (2012). The development of a conceptual model to support sustainable tourism policy in north Mediterranean destinations. *Journal of Hospitality Marketing & Management*, *21*(7), 710–738. https://doi.org/10.1080/19368623.2012.624298

Filimonau, V., & Tochukwu, C. O. (2020). Exploring managerial approaches to mitigating solid waste in hotels of Lagos, Nigeria. *Journal of Cleaner Production*, *270*(1), 122410–122418. https://doi.org/10.1016/j.jclepro.2020.122410

Font, X., Tapper, R., Schwartz, K., & Kornilaki, M. (2008). Sustainable supply chain management in tourism. *Business Strategy and the Environment*, *17*(4), 260–271. https://doi.org/10.1002/bse.527

Fraj, E., Matute, J., & Melero, I. (2015). Environmental strategies and organizational competitiveness in the hotel industry: The role of learning and innovation as determinants of environmental success. *Tourism Management*, *46*(1), 30–42. https://doi.org/10.1016/j.tourman.2014.05.009

França, A., Silva, J. M. D. D., & Marques Júnior, S., (2003). Environmental Performance Indicators in the Hotel Industry: A Methodological Analysis. In *Conference proceedings of POM 2003-POM in the Service Economy* (pp. 1–12). Production and Operations Management Society, USA.

Galeazzo, A., Ortiz-de-mandojana, N., & Delgado-Ceballos, J. (2021). Green procurement and financial performance in the tourism industry: The moderating role of tourists' green purchasing behavior. *Current Issues in Tourism*, *24*(5), 1–17. https://doi.org/10.1080/13683500.2020.1734546

Goodman, A. (2000). Implementing sustainability in service operations at Scandic hotels. *Interfaces*, *30*(3), 202–214. https://doi.org/10.1287/inte.30.3.202.11653

Gössling, S., & Lund-Durlacher, D. (2021). Tourist accommodation, climate change and mitigation: An assessment for Austria. *Journal of Outdoor Recreation and Tourism*, *34*(1), 100275–100367. https://doi.org/10.1016/j.jort.2021.100367

Graci, S., & Dodds, R. (2008). Why go green? The business case for environmental commitment in the Canadian hotel industry. *Anatolia*, *19*(2), 251–270. https://doi.org/10.1080/13032917.2008.9687072

Green Hotel Association. (2021). *What are green hotels*. http://greenhotels.com/index.php

GRI. (2018a). *GRI 101: Foundation 2016*. https://www.globalreporting.org/standards/media/1036/gri-101-foundation-2016.pdf.

GRI. (2018b). *GRI 102: General disclosure 2016*. https://www.globalreporting.org/standards/media/1037/gri-102-general-disclosures-2016.pdf.

Harris, S., Mata, É., Plepys, A., & Katzeff, C. (2021). Sharing is daring, but is it sustainable? An assessment of sharing cars, electric tools and offices in Sweden. *Resources, Conservation and Recycling*, *170*(1), 105583–105595. https://doi.org/10.1016/j.resconrec.2021.105583

Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review*, *20*(4), 986–1014. https://doi.org/10.5465/amr.1995.9512280033

Hart, S. L., & Dowell, G. (2011). Invited editorial: A natural-resource-based view of the firm: Fifteen years after. *Journal of Management*, *37*(5), 1464–1479. https://doi.org/10.1177/0149206310390219

Hazen, B. T., Cegielski, C., & Hanna, J. B. (2011). Diffusion of green supply chain management: Examining perceived quality of green reverse logistics. *The International Journal of Logistics Management*, *22*(3), 373–389. https://doi.org/10.1108/09574091111181372

Hazen, B. T., Wu, Y., Cegielski, C. G., Jones-Farmer, L. A., & Hall, D. J. (2012). Consumer reactions to the adoption of green reverse logistics. *The International Review of Retail, Distribution and Consumer Research*, *22*(4), 417–434. https://doi.org/10.1080/09593969.2012.690777

Heikkurinen, P. (2011). Environmental strategy and sustainability. In Idowu, S., Louche, C. (eds) *Theory and Practice of Corporate Social Responsibility* (pp. 123–140). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-16461-3_8

Hotel Energy Solutions. (2011). *Analysis on Energy Use by European Hotels: Online Survey and Desk Research*. https://www.e-unwto.org/doi/pdf/10.18111/9789284414970#:~:text=European%20studies%20have%20estimated%20savings,by%20their%20specific%20operational%20features

Hyatt, D. G., & Berente, N. (2017). Substantive or symbolic environmental strategies? Effects of external and internal normative stakeholder pressures. *Business Strategy and the Environment*, *26*(8), 1212–1234. https://doi.org/10.1002/bse.1979

Jones, P., & Comfort, D. (2019). Sustainable development goals and the world's leading hotel groups. *Athens Journal of Tourism*, *6*(1), 1–14. https://doi.org/10.30958/ajt.6-1-1

Kasim, A., Gursoy, D., Okumus, F., & Wong, A. (2014). The importance of water management in hotels: A framework for sustainability through innovation. *Journal of Sustainable Tourism*, *22*(7), 1090–1107. https://doi.org/10.1080/09669582.2013.873444

Kim, Y. H., Barber, N., & Kim, D. K. (2019). Sustainability research in the hotel industry: Past, present, and future. *Journal of Hospitality Marketing & Management*, *28*(5), 576–620. https://doi.org/10.1080/19368623.2019.1533907

Kozak, M. (2009). What is strong correlation? *Teaching Statistics*, *31*(3), 85–86. https://doi.org/10.1111/j.1467-9639.2009.00387.x

LaMorte, W. W. (2021). *PH7 17 module 9- correlation and regression*. Boston University, School of Public Health. Retrieved January 30, 2021. https://sphweb.bumc.bu.edu/otlt/MPH-Modules/PH717-QuantCore/PH717-Module9-Correlation-Regression/PH717-Module9-Correlation-Regression4.html

Laugen, B. T., Acur, N., Boer, H., & Frick, J. (2005). Best manufacturing practices: What do the best-performing companies do? *International Journal of Operations & Production Management*, *25*(2), 131–150. https://doi.org/10.1108/01443570510577001

Lavrakas, P. J. (2008). *Encyclopedia of survey research methods*. Sage publications.

Lee, J. Y., & Yim, T. (2021). Energy and flow demand analysis of domestic hot water in an apartment complex using a smart meter. *Energy*, *229*(1), 120678–120692. https://doi.org/10.1016/j.energy.2021.120678

Li, Y., & Yang, X., (2011). A study of competitive advantage on services package-based economy hotel:" 7 days inn" as a case. In *2011 International Conference on Management and Service Science* (pp. 1–4). IEEE. http://doi.org/10.1109/ICMSS.2011.5998812

Lin, N., Rosemberg, M. A., Li, W., Meza-Wilson, E., Godwin, C., & Batterman, S. (2021). Occupational exposure and health risks of volatile organic compounds of hotel housekeepers: Field measurements of exposure and health risks. *Indoor Air*, *31*(1), 26–39. https://doi.org/10.1111/ina.12709

Ling, T. C., Poon, C. S., & Wong, H. W. (2013). Management and recycling of waste glass in concrete products: Current situations in Hong Kong. *Resources, Conservation and Recycling*, *70*(1), 25–31. https://doi.org/10.1016/j.resconrec.2012.10.006

Mak, A. H., & Chang, R. C. (2019). The driving and restraining forces for environmental strategy adoption in the hotel industry: A force field analysis approach. *Tourism Management*, *73*(1), 48–60. https://doi.org/10.1016/j.tourman.2019.01.012

Masa'deh, R., Alananzeh, O., Algiatheen, N., Ryati, R., Albayyari, R., & Tarhini, A. (2017). The impact of employee's perception of implementing green supply chain management on hotel's economic and operational performance. *Journal of Hospitality and Tourism Technology*, *8*(3), 395–416. https://doi.org/10.1108/JHTT-02-2017-0011

Migdadi, Y. K. A. A. (2015). Identifying the best practices in banking operations strategy in developing economics: The case of Jordan. *International Journal of Business Excellence*, *8*(1), 38–84. https://doi.org/10.1504/IJBEX.2015.065980

Migdadi, Y. K. A. A. (2018). Identifying the best practices of airlines' green operations strategy: A cross-regional worldwide survey. *Environmental Quality Management*, *28*(1), 21–32. https://doi.org/10.1002/tqem.21575

Migdadi, Y. K. A. A. (2019). The effective practices of mobile phone producers' green supply chain management in reducing GHG emissions. *Environmental Quality Management*, *28*(3), 17–32. https://doi.org/10.1002/tqem.21619

Migdadi, Y. K. A. A. (2020). Identifying the effective taxonomies of airline green operations strategy. *Management of Environmental Quality: An International Journal*, *31*(1), 146–166. https://doi.org/10.1108/MEQ-03-2019-0067

Migdadi, Y. K. A. A., & Omari, A. A. (2019). Identifying the best practices in green operations strategy of hospitals. *Benchmarking: An International Journal*, *26*(4), 1106–1131. https://doi.org/10.1108/BIJ-09-2017-0242

Modica, P. D., Altinay, L., Farmaki, A., Gursoy, D., & Zenga, M. (2020). Consumer perceptions towards sustainable supply chain practices in the hospitality industry. *Current Issues in Tourism*, *23*(3), 358–375. https://doi.org/10.1080/13683500.2018.1526258

Mok, W. K., Tan, Y. X., & Chen, W. N. (2020). Technology innovations for food security in Singapore: A case study of future food systems for an increasingly natural resource-scarce world. *Trends in Food Science & Technology*, *102*(1), 155–168. https://doi.org/10.1016/j.tifs.2020.06.013

Ojielo, O. (2018, June 24). *UN resident coordinator Ozonnia Ojielo's speech at opening of tourism Exp. 2018*. UN Kyrgyzstan Republic. Retrieved June 27, 2021, from https://kyrgyzstan.un.org/en/13376-un-resident-coordinator-ozonnia-ojielos-speech-opening-tourism-expo-2018

Parpairi, K. (2017). Sustainability and energy use in small scale Greek hotels: Energy saving strategies and environmental policies. *Procedia Environmental Sciences*, *38*(1), 169–177. https://doi.org/10.1016/j.proenv.2017.03.099

Phu, S. T. P., Fujiwara, T., Hoang, M. G., Tran, M. T., & Tran, M. T. (2019). Waste separation at source and recycling potential of the hotel industry in Hoi An city, Vietnam. *Journal of Material Cycles and Waste Management*, *21*(1), 23–34. https://doi.org/10.1007/s10163-018-0807-5

Pumhiran, N. (2015). Integration of organic foods into Thailand's Hotel Industry as Opportunities. *Asian Journal of Management and Innovation*, *3*(1), 99–107. https://ajmi.scholasticahq.com/article/11582.pdf#page=99

Rahman, I., & Reynolds, D. (2016). Predicting green hotel behavioral intentions using a theory of environmental commitment and sacrifice for the environment. *International Journal of Hospitality Management*, *52*(1), 107–116. https://doi.org/10.1016/j.ijhm.2015.09.007

Rao, P., la O'castillo, O., Intal, P. S., Jr, & Sajid, A. (2006). Environmental indicators for small and medium enterprises in the Philippines: An empirical research. *Journal of Cleaner Production*, *14*(5), 505–515. https://doi.org/10.1016/j.jclepro.2005.03.016

Rathnayake, R. M. D. I. M., Jayawickrama, T. S., & Melagoda, D. G. (2020). Prospect of establishing electric vehicle charging stations at public hotspots. *Intelligent Buildings International*, *12*(4), 318–330. https://doi.org/10.1080/17508975.2020.1765135

Rico, A., Olcina, J., Baños, C., Garcia, X., & Sauri, D. (2020). Declining water consumption in the hotel industry of mass tourism resorts: Contrasting evidence for Benidorm, Spain. *Current Issues in Tourism*, *23*(6), 770–783. https://doi.org/10.1080/13683500.2019.1589431

SAGE. (2019). *Learn to use the Eta Coefficient test in R with data From the NIOSH Quality of Work life survey (2014)*. SAGE research method database. https://methods.sagepub.com/base/download/DatasetHowToGuide/eta-coefficient-niosh-qwl-2014-r

Sari, K., & Suslu, M. (2018). A modeling approach for evaluating green performance of a hotel supply chain. *Technological Forecasting and Social Change*, *137*(1), 53–60. https://doi.org/10.1016/j.techfore.2018.06.041

Schwartz, K., Tapper, R., & Font, X. (2008). A sustainable supply chain management framework for tour operators. *Journal of Sustainable Tourism*, *16*(3), 298–314. https://doi.org/10.1080/09669580802154108

Sharma, S. (2000). Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy. *Academy of Management Journal*, *43*(4), 681–697. https://doi.org/10.5465/1556361

Shiming, D., & Burnett, J. (2002). Energy use and management in hotels in Hong Kong. *International Journal of Hospitality Management*, *21*(4), 371–380. https://doi.org/10.1016/S0278-4319(02)00016-6

Shukla, V. V., & Tambe, P. P. (2018). Decision factors in the selection of elevator. *i-Manager's Journal on Mechanical Engineering*, *8*(2), 42–51. https://doi.org/10.26634/jme.8.2.14212

Singh, N., Cranage, D., & Lee, S. (2014). Green strategies for hotels: Estimation of recycling benefits. *International Journal of Hospitality Management*, *43*(1), 13–22. https://doi.org/10.1016/j.ijhm.2014.07.006

Songxue, L., & Xiping, C. (2014). Investigation on contamination of Legionella pneumophila in recycled water from central air conditioning systems and shower water in large hotels of an urban district in Beijing. *环境卫生学杂志*, *3*(1), 289-291. https://en.cnki.com.cn/Article_en/CJFDTotal-GWYX201403005.htm

Taylor, S., Peacock, A., Banfill, P., & Shao, L. (2010). Reduction of greenhouse gas emissions from UK hotels in 2030. *Building and Environment*, *45*(6), 1389–1400. https://doi.org/10.1016/j.buildenv.2009.12.001

Thimmaraju, M., Sreepada, D., Babu, G. S., Dasari, B. K., Velpula, S. K., & Vallepu, N. (2018). Desalination of water. In M. Eyvaz & E. Yuksel (Eds.), *Desalination and Water Treatment* (pp. 333–347). IntechOpen Book Series.

Thomas-Francois, K., Joppe, M., & von Massow, M. (2018). Improving linkages through a service-oriented local farmers–hotel supply chain—An explanatory case in Grenada. *Tourism Planning & Development*, *15*(4), 398–418. https://doi.org/10.1080/21568316.2017.1338200

Thumann, A., Niehus, T., & Younger, W. J. (2020). *Energy Audit Basic: Handbook of Energy Audits*. The Fairmont Press.

Tortella, B. D., & Tirado, D. (2011). Hotel water consumption at a seasonal mass tourist destination. The case of the Island of Mallorca. *Journal of Environmental Management*, *92* (10), 2568–2579. https://doi.org/10.1016/j.jenvman.2011.05.024

Ubeda, S., Arcelus, F. J., & Faulin, J. (2011). Green logistics at Eroski: A case study. *International Journal of Production Economics*, *131*(1), 44–51. https://doi.org/10.1016/j.ijpe.2010.04.041

United Nations World Tourism Organization. (2021). *How tourism can contribute to the sustainability development goals (SDGs)*. https://tourism4sdgs.org/tourism-for-sdgs/tourism-and-sdgs/

Venkatesh, R. B., & Sivaramkumar, V. (2017). Design and fabrication of automatic dishwasher machine. *International Journal SSRG*, *4*(3), 26–31. https://doi.org/10.14445/23488360/IJME-V4I3P102

Verghese, K., Lewis, H., Lockrey, S., & Williams, H. (2015). Packaging's role in minimizing food loss and waste across the supply chain. *Packaging Technology and Science*, *28*(7), 603–620. https://doi.org/10.1002/pts.2127

Wang, L., Iris, K. M., Tsang, D. C., Yu, K., Li, S., Poon, C. S., & Dai, J. G. (2018). Upcycling wood waste into fibre-reinforced magnesium phosphate cement particleboards. *Construction and Building Materials*, *159*(1), 54–63. https://doi.org/10.1016/j.conbuildmat.2017.10.107

Xu, X., & Gursoy, D. (2015a). Influence of sustainable hospitality supply chain management on customers' attitudes and behaviors. *International Journal of Hospitality Management*, *49*(1), 105–116. https://doi.org/10.1016/j.ijhm.2015.06.003

Xu, X., & Gursoy, D. (2015b). A conceptual framework of sustainable hospitality supply chain management. *Journal of Hospitality Marketing & Management*, *24*(3), 229–259. https://doi.org/10.1080/19368623.2014.909691

Yasin, S., Behary, N., Perwuelz, A., & Guan, J. (2018). Life cycle assessment of flame retardant cotton textiles with optimized end-of-life phase. *Journal of Cleaner Production*, *172*(1), 1080–1088. https://doi.org/10.1016/j.jclepro.2017.10.198

Zhang, X., Song, H., & Huang, G. Q. (2009). Tourism supply chain management: A new research agenda. *Tourism Management*, *30*(3), 345–358. https://doi.org/10.1016/j.tourman.2008.12.010

Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics*, *111*(2), 261–273. https://doi.org/10.1016/j.ijpe.2006.11.029