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Typologies of hotel green supply chain management strategy

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ABSTRACT

The aim of this paper was to develop typologies of hotel green supply chain management (HGSCM) strategy. The typologies were developed through tracing the practices of nine best-performing hotels from various regions over the period 2017–2019. The data were retrieved from the global reporting initiatives database. The cases were classified according to their shared actions categories along the supply chain. Next, the cases were reclassified according to the number of their shared green performance dimensions. Then the typologies matrix of the relevant HGSCM strategy was developed. This matrix has two dimensions: the extension of the supply chain and the number of green indicators. From the intersection between the matrix dimensions twelve typologies were generated, but the number of typologies adopted by the best-performing hotels was five. This is the first study to have developed typologies of the HGSCM strategy.

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Typology; hotel; green; supply chain; strategy; sustainability


Introduction

The impact of hotels on ecological environment is very significant. Hotels use more energy than all the other tourism sectors (Mak & Chang, 2019) and are in the five worst in this respect (Hotel Energy Solutions [HES], 2011). In addition, hotels in developed countries consume 2–3 times the normal amount of water per capita (Deyà Tortella & Tirado, 2011).

The significant impact of the tourism sector on the ecological environment is discussed by the UN in its report on the 17 sustainability development goals (SDGs). This sector contributes directly to goals 8, 12 and 14. Moreover, the agenda after 2015 put the tourism sector in a significant position for implementing its framework (United Nations World Tourism Organization [UNWTO], 2021). Accordingly, it is even more urgent than before that hotels should adopt the best green practices throughout their supply chain for the sake of having a more positive environmental impact and best achieving of the UN SDGs.

Some empirical studies of hotel green management have reported the practices of hotel green supply chain management (HGSCM) (e.g. Al-Aomar & Hussain, 2017; Enz & Siguaw, 1999; Erdogan & Baris, 2007; Gössling & Lund-Durlacher, 2021; Mak & Chang, 2019; Modica et al., 2020; Sari & Suslu, 2018). Some studies have described the management of the green supply chain in relation to a particular green indicator (e.g. Singh et al., 2014; Taylor et al., 2010).

Other researchers have examined the impact of implementing HGSCM on economic and operational performance (e.g. Masa'deh et al., 2017), and on customers' satisfaction, loyalty and willingness to pay more for green hotels (e.g. Xu & Gursoy, 2015a). Other researchers

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developed conceptual frameworks of hotel sustainable and green supply chain (e.g. Xu & Gursoy, 2015b), or developed conceptual models related to a particular green indicator (e.g. Kasim et al., 2014).

Very limited studies of HGSCM have identified clearly the processes and sub-processes of the supply chain (e.g. Migdadi, 2022; Xu & Gursoy, 2015b; Zhang et al., 2009). Most frameworks developed by these studies are generally applicable to the hospitality sector, not hotels in particular. Most studies focused on studying the internal processes in the hotels (e.g. Gössling & Lund-Durlacher, 2021; Kasim et al., 2014; Parpairi, 2017). The internal processes are significant, but all the links in the supply chain need to make the effort to be sustainable, whether upstream or downstream processes of hotels supply chain (Modica et al., 2020). These days, environmental strategies are more concerned with systems for managing the environment holistically (Mak & Chang, 2019).

Despite the extensive discussion of hotel green practices in previous studies, HGSCM in particular has contributed little, being a new area (Al-Aomar & Hussain, 2017; Chen et al., 2021; Migdadi, 2022). Before such practices are adopted, managers should learn from the experiences of best cases, but this relies on having a firm and comprehensive conceptual and theoretical stance. Accordingly, developing typologies of the HGSCM strategy represents a mid-range theory, which contributes to the theoretical stance of HGSCM. In typology, organizations are classified into ideal types, each type leading to a particular outcome and representing a unique combination of organizational attributes (Doty & Glick, 1994).

The research on supply chain management typologies in general (e.g. Narasimhan et al., 2008; Whipple & Russell, 2007) and green supply chain management typologies in particular is very scanty (e.g. Carrasco-Gallego et al., 2012; Usama & Ramish, 2020). Few studies (e.g. Usama & Ramish, 2020; Whipple & Russell, 2007) have developed typologies according to one attribute of the supply chain, or according to two attributes (with the exception of e.g. Abbey & Guide, 2018; Wells & Seitz, 2005). A few studies, however, have adopted multi-factors of hotel supply chain management (e.g. Carrasco-Gallego et al., 2012; Narasimhan et al., 2008).

The previous studies that focused on reporting best practices have not developed a clear classification for the dimensions of green practices and have not examined the impact of these practices on performance (e.g. Cingoski & Petrevska, 2018; Mak & Chang, 2019). Some studies have covered some dimensions of HGSCM (e.g. Modica et al., 2020). The study that developed a comprehensive model of the HGSCM strategy was made by Migdadi (2022). However, no previous studies of HGSCM have developed typologies of the green strategies.

Accordingly, this study seeks to plug the previous gaps by developing typologies of HGSCM, based on the practices of leading hotels in this endeavour. This study traced all the green performance indicators and all HGSCM actions. To attain the previous aim, the following objectives had to be achieved;

- Developing a conceptual framework of typologies of the HGSCM strategy
- Identifying the green supply chain management actions taken and green indicators achieved by the best green-performing hotels
- Identifying the attributes that will be used in the present paper to develop the typologies of the HGSCM strategy
- Identifying the typologies according to different combinations of the attributes

This paper is structured in five sections. The first section is the literature review, followed by the conceptual framework of the HGSCM strategy; next comes the methodology, and then the findings. The subsequent discussion precedes a conclusion, which brings out implications, limitations and suggestions for future researchers.

Literature review

HGSCM strategy theory and models

Different perspectives have been adopted in identifying the organizations involved and the activities of the hospitality sectors green supply chains. The first widely adopted perspective is that of the stakeholders (e.g. Chen et al., 2021; Cho et al., 2012; Xu & Gursoy, 2015a, 2015b). From this perspective, the transformation from a traditional to a green supply chain requires the efforts of all stakeholders (Chen et al., 2021). Hence, a sustainable supply chain in this sector involves the various suppliers and retailers of all the associated goods and services and involves the customers to whom goods and services are delivered (Modica et al., 2020; Xu & Gursoy, 2015a, 2015b). Furthermore, from this perspective, the range of stakeholders could be extended to include others in posts of regulatory supervision who play no direct part in making hotel green products or services (Chen et al., 2021).

The second perspective is process-oriented, which classifies the organizations engaged in processes in the sustainable hospitality supply chain, whether upstream, midstream or downstream. The upstream includes tier 1 and tier 2 suppliers; tier 1 suppliers are direct suppliers who interact directly with midstream process, tier 2 suppliers, are those supplying the products and services to the first tier. The midstream processes are those that provide services to customers such as hotels. Finally, downstream are the end users in the supply chain, or the customers (Xu & Gursoy, 2015a; Zhang et al., 2009).

The third framework that was adopted derives from system theory and value creation. According to this, the analysis of green supply chain processes is based on the direct contribution to the green value of a hotel's green products and services, and the value is defined by customers. Hence, the supplier-input-process-output-customer structure of the hotel supply chain was used to analyse the green practices (Al-Aomar & Hussain, 2017).

The natural resources-based viewpoint (NRBV) and institutional theory are the two perspectives adopted by the studies of HGSCM. There are very few empirical and conceptual studies of institutional theory in comparison with NRBV studies (e.g. Xu & Gursoy, 2015b). Some studies identify the competitive practices of green procurement (e.g. Galeazzo et al., 2020), or the competitive advantages of having a hotel green supply chain (e.g. Al-Aomar & Hussain, 2017; Chen et al., 2021; Erdogan & Baris, 2007; Fantazy et al., 2010; Masa'deh et al., 2017; Sari & Suslu, 2018). Other studies have developed conceptual frameworks for hospitality sustainable supply chains and tourism in general (e.g. Farasi, 2012; Schwartz et al., 2008; Xu & Gurscy, 2015b).

The NRBV is more widely adopted by studies of best practices in HGSCM (e.g. Al-Aomar & Hussain, 2017; Enz & Siguaw, 1999; Fraj et al., 2015; Kasim et al., 2014; Migdadi, 2022; Singh et al., 2014) than institutional theory is (e.g. Mak & Chang, 2019). The present study adopts the NRBV since it is not investigating the impact of the external environment on the adoption of best practices.

Typologies of the HGSCM strategy theory and models

Taxonomy and typology are two concepts that are used interchangeably, but as scientific terminologies, these concepts differ (Migdadi, 2020). Taxonomies are classification schemes that extend from the quantitative analysis of a pool of data related to a particular phenomenon, so taxonomies reflect the best and worst practice as parts of a continuum. Typologies, however, show many ideal types; each one representing a combination of the organizational attributes that have determined a particular outcome (Doty & Glick, 1994).

Typologies are more flexible than taxonomies since multiple types can lead to optimal performance. The closer the company to the ideal model, the more effective will it seem in its description (Doty & Glick, 1994; Kolk & Mauser, 2002). The attributes listed in developing typologies could be related to internal business processes or the external environment or both combined (Kolk & Mauser, 2002).

The typologies have been a research issue for supply chain management studies, but the research contribution is limited. For example, one study has developed typologies according to the type of collaboration in managing supply chain management (Whipple & Russell, 2007). Another study listed typologies according to the degree of correlation between the corporate supply chain initiative and its functional initiatives, and the impact of these initiatives on financial and market performance (Narasimhan et al., 2008). Typologies of green supply chain management strategy are also limited. The study by Wells and Seitz (2005) proposed typologies of closed-loop supply chain. The study by Carrasco-Gallego et al. (2012) developed typologies of reusable article, referring to durable products intended to be used many times by different users along the supply chain. The study by Abbey and Guide (2018) developed typologies of remanufacturing.

The study by Roscoe et al. (2016) focused on eco-innovation supply chain management typologies. Another study, by Difrancesco and Huchzermeier (2016), developed typologies according to the actors involved in closed-loop supply chain management. The study by Usama and Ramish (2020) developed typologies of configuring RFID in a closed-loop and reverse logistics supply chain.

The studies of the HGSCM strategy have not developed typologies of strategies, but some studies report the strategies of best practices; for example, the early study of Enz and Siguaw (1999) reported the best practices of selected cases and classified the best practices of hotel green strategy as recycling programmes, customer involvement, waste policies, green purchasing and upcycling. This study adopted some dimensions of HGSCM but did not investigate the impact of the adopted strategies on performance.

The study by Singh et al. (2014) identified the best hotels in recycling and impact of recycling on financial indicators and the reduction of GHG emissions. The study by Al-Aomar and Hussain (2017) identified the best practices of green supply chains but did not clearly classify dimensions and their impact on performance. The study by Sari and Suslu (2018) classified the practices of HGSCM into basic and advanced but did not examine the impact of these practices on the hotels' green performance.

Cingoski and Petrevska's study (2018) focused on identifying the best practices in making hotel more energy efficient. According to this study, best practices can be classified under environmental policy or resources, both dimensions being related to hotels' designs for green internal processes. These writers examined the impact of actions on performance indicators, for example, improving the image and reducing the cost.

Mak and Chang (2019) found 21 green strategies categorized as 14 key areas. Despite the significance of this study, the strategies that developed were not based on consistent and clear dimension. They combined performance indicators with some dimensions of supply chain management; moreover, the study did not investigate the impact of the proposed strategic actions on green performance.

Chandran and Bhattacharya (2019) reported the strategies widely adopted by hotels under three environmental performance headings but discerned no clear relationship between the actions adopted and the strategic dimensions of the HGSCM. Modica et al. (2020) classified the best-adopted green practices under such headings as green service procedures, green product purchasing, product management during use, product life extension, pollution control and recycling. This classification is in some ways close to the dimensions of HGSCM, but the paper did not cover all the dimensions in detail, and did not examine the impact of adopted actions on green performance.

Filimonau and Tochukwu (2020) developed a framework for managing the solid waste from hotels. The proposed framework is more closely related to staff commitment practices and environment controlling systems and facilities, which is part of a hotel's internal process design, so this framework has very limited applicability – to only one dimension of the HGSCM strategy and to one green performance indicator which is solid waste. Gössling and Lund-Durlacher (2021) focused on best practices in saving energy. This study focused on one dimension of the supply chain, namely, hotel internal process design and on one green performance indicator.

Migdadi's study (2022) study identified the best practices in the HGSCM strategy under each of the following green indicators: GHG emissions, energy, water, waste and recycling. This study found that the widely adopted best practices were related to internal green process, green quality management, green procurement management and green management of customer relationships.

The conceptual framework of typologies of hotels' green supply chain management strategy

As discussed in the introduction section, above, there are few conceptual models of the HGSCM strategy in general and typologies of the HGSCM strategy in particular. Accordingly, this section discusses a proposed framework for developing the typologies of the HGSCM strategy. First, the actions and green indicators are identified, followed by the classification attributes of actions or green indicators, and finally, a classification scheme of typologies is outlined. This framework could be used as a guide for future studies in different contexts that develop the typologies of the HGSCM management strategy.

Identifying the HGSCM strategy actions and indicators

Previous studies have adopted different perspectives but very few of them have identified clearly the processes and sub-processes of hotels' green supply chains (e.g. Migdadi, 2022). The most comprehensive and detailed classification was developed by Migdadi (2022), whose framework is accordingly adopting in the present study, since this framework accommodates the upstream, midstream and downstream processes of the hotel green supply chain. This framework was seen from a process-oriented and value-creation perspective.

A hotel's green supply chain includes the following processes: upstream green processes and green supplier processes, including processes adapted to first-tier suppliers. These processes include the green supplying of vegetables and fruits, the green supplying of food and drinks, the green supplying of equipment, materials and furniture, the green supplying of products, the green supplying of water and energy, the green supplying process of training and development institutions (Zhang et al., 2009) and the green logistics process (Xu & Gursoy, 2015b).

Midstream green processes or green internal processes: hotels provide a package of tangible and intangible services (Li & Yang, 2011). The internal processes, according to Krstić et al. (2015) are green housekeeping processes, green procedures for the arrival and departure of guests and green procedures for producing and serving foods and beverages.

Downstream green processes/guest green processes: which includes collecting information from guests and acquainting them with the hotel's internal processes (Zhang et al., 2009). Green reverse logistics process: this recycles, reuses, remanufactures or upcycles at the end of a product's life cycle generated by hotels (Hazen et al., 2011). Reusing is conducted by relief agencies or animal feed institutions or hotels (Al-Aomar & Hussain, 2017). Remanufacturing and upcycling processes are conducted by hotels (Wang et al., 2018; Yasin et al., 2018), but recycling may be undertaken by professional recycling companies and agencies whether governmental, non-governmental or private (Mak & Chang, 2019), or hotels (Al-Aomar & Hussain, 2017).

Previous studies have classified the dimensions of green supply chain management as product management during use, greener service processes, recycling, product life extension and pollution control (Modica et al., 2020), the purchasing of greener products or green procurement (Galeazzo et al., 2020), logistics (Font et al., 2008), environmental protection programmes and managing solid waste (Erdogan & Baris, 2007).

Green supply chain management strategy is a stream of actions related to functions of HGSCM that provides hotels with environmental competitive advantage, and adherence to organizational goals (Cho et al., 2012). This study adopts the framework developed by Migdadi (2022); this

framework has comprehensive functions dimensions, actions and performance indicators. In this framework, the HGSCM dimensions are as follows: hotel green logistics process design, green procurement management, internal green processes design, green quality management and internal commitment, green relationships with customers and green reverse logistics management. Each dimension includes a set of actions.

Moreover, according to Migdadi (2022), the green performance indicators for hotels are the reduction in direct GHG1, indirect GHG2, indirect GHG3 emissions, reduction in GHG emissions per guest night and room, reduction in energy consumption, energy consumption per guest night and room, reduction in total water consumption, reduction in water consumption per guest night and room, increase in recycling and reduction in total waste.

Identifying the classification variables of typologies

Different approaches describe how organizations have adopted green strategies. One of these approaches classified the adoption of environmental strategy on a continuum between conformance to regulations and voluntary. Conformance involves complying with regulations and adopting standards of industry environmental practices such as the practices of NGOs, governmental regulations and competitors. However, a voluntary environmental strategy represents a consistent pattern of company actions taken to reduce the environmental impact of operations, not to fulfil environmental regulations or to conform to standard practices (Sharma, 2000). Hotels can adopt environmental strategies as proactively or reactively (Fraj et al., 2015).

Another approach classifies the environmental strategies as substantive or symbolic. With the substantive approach, the environmental practices reflect a firm has internalized voluntary commitment to natural environment and dedication to environmental leadership. In contrast, with a symbolic approach, environmental practices are adopted merely to manage the image of organization positively in the face of external forces, so the organization will appear committed to the natural environment (Hyatt & Berente, 2017). Moreover, the environmental strategy could be classified as either instrumental strategy or awareness strategy. Instrumental strategy bases the core values on utilitarian ethics; environmental responsibility is mainly a tool to achieve economic gains, whereas the awareness strategy takes environmental responsibility as a tool to achieve environmental gains (Heikkurinen, 2011).

The classification variables of supply chain typologies that previous studies have adopted are various. One of these studies developed typologies according to the type of collaboration in supply chain management (Whipple & Russell, 2007). Another study found typologies according to the degree of correlation between corporate supply chain initiative and supply chain functional initiatives, and the impact of these initiatives on financial and market performance (Narasimhan et al., 2008).

The classification variables of typologies of green supply chain management strategy are also different. The study by Wells and Seitz (2005) proposed typologies of closed-loop supply chain. The features adopted were the source of initiation of the closed-loop supply, whether internal or external, and the degree of adopting reverse logistics processes.

The study by Carrasco-Gallego et al. (2012) developed typologies of reusable articles, referring to the durable products intended to be used many times by different users along the supply chain. The study by Abbey and Guide (2018) developed typologies of remanufacturing. The variables adopted to develop the typologies were two: the strategic focus and the design focus. The first feature has two options in its strategy: whether to focus on profit or cost. The second feature options were single use design or robust design.

The study by Roscoe et al. (2016) focused on eco-innovative supply chain management typologies. The adopted variable was the degree of the tied relationship between the company and its suppliers in making eco-innovations. Another study by Difrancesco and Huchzermeier (2016) focused on developing typologies according to the actors involved in closed-loop supply chain management.

The study by Usama and Ramish (2020) developed typologies of configuring RFID in closed-loop and reverse logistics supply chains. The adopted feature was the how far RFID has been adopted along the supply chain.

The widely adopted and shared variables in developing the typologies of supply chain management strategy are the flow of the supply chain and the direction of flow, whether forward, reverse logistics or closed-loop (e.g. Carrasco-Gallego et al., 2012; Narasimhan et al., 2008). The degree of extension of supply chain management actions can be focused on particular processes, or extended across processes or actors in the supply chain (Difrancesco & Huchzermeier, 2016; James et al., 2018; Roscoe et al., 2016; Usama & Ramish, 2020; Wells & Seitz, 2005; Whipple & Russell, 2007). In addition, the performance dimensions achieved by the supply chain were used as attributes in developing the typologies (e.g. James et al., 2018; Narasimhan et al., 2008).

According to the results of empirical studies, the effective actions for a hotel practising green supply chain management could be extended along all the supply chain processes (e.g. Al-Aomar & Hussain, 2017; Enz, 1999; Migdadi, 2022), or limited to a particular process in the supply chain (e.g. Cingoski & Petrevska, 2018; Filimonau & Tochukwu, 2020; Gössling & Lund-Durlacher, 2021; Singh et al., 2014).

Moreover, the effective strategies could be adopted by forward flow processes (e.g. Cingoski & Petrevska, 2018), or reverse logistics or closed loop (e.g. Migdadi, 2022; Modica et al., 2020). Furthermore, the effective strategies are marked by one or more green performance indicators (e.g. Chandran & Bhattacharya, 2019; Gössling & Lund-Durlacher, 2021; Mak & Chang, 2019; Migdadi, 2022).

Identifying the typologies

The typologies are generated as an outcome of adopting green actions or green performance indicator variables. Different typologies were developed in previous studies of supply chain management. For example, the typologies generated according to the type of collaboration in supply chain management are three in number: collaborative event management, collaborative transaction management and collaborative process management (Whipple & Russell, 2007).

Another study found typologies according to the degree of correlation between corporate supply chain initiative and supply chain functional initiatives, and the impact of these initiatives on financial and market performance. This study proposed six typologies some extending along the supply chain, others focused on upstream or downstream or midstream and yet others extended to include reverse logistics and closed-loop supply chains. Each typology has its own actions and achieved a particular combination of performance indicators (Narasimhan et al., 2008).

Moreover, the studies of typologies of green supply chain management strategy developed different typologies. For example, the study by Wells and Seitz (2005) proposed typologies of closed-loop supply chain, as follows: internal, post-business, post-consumer and post-society. The study by Carrasco-Gallego et al. (2012) developed typologies showing whether reusable articles were returnable transportation items, returnable packaging material or reusable products.

The study by Abbey and Guide (2018) developed typologies of remanufacturing. The recommended typologies were multiple lifecycle products, durability and reparability, commercial returns and third party remanufacturing. The study by Roscoe et al. (2016) focused on eco-innovation supply chain management typologies. According to this study, the typologies number three; tight (strong ties), loose (weak ties) and bridge (weak ties). The study by Difrancesco and Huchzermeier (2016) focused on developing typologies according to the actors involved in closed-loop supply chain management. The proposed typologies were inter-arrival time distribution, service time distribution and stochastic demand. The study by Usama and Ramish (2020) developed typologies of configuring RFID in closed-loop and reverse logistics supply chains. The proposed typologies were wide tracking and postponed tracking.

The above discussion shows that most of the different typologies that have been developed have focused on a particular process or practice of the supply chain, for example, the typologies of closed-

loop supply chain management, typologies of remanufacturing, the typologies of actors involved in closed-loop supply chain management, and typologies of configuring RFID in closed-loop and reverse logistics supply chain. Very few studies have developed typologies covering different practices or processes along the supply chain. No typologies point to common features in different studies; the reasoning in most studies were focused instead on a particular process or practice of the supply chain.

Methodology

The methodology adopted by previous studies could be divided into theoretical studies, those analysing the literature according to the attributes related to green supply chain practices or performance indicators or both (e.g. Abbey & Guide, 2018; Difrancesco & Huchzermeier, 2016; Roscoe et al., 2016; Usama & Ramish, 2020); and empirical studies, analysing selected cases if they were leaders in differing aspects of green supply chain management (e.g. Whipple & Russell, 2007), or analysing a large samples, when the typologies were identified according to the close correlation between supply chain practices and performance indicators (e.g. Narasimhan et al., 2008).

This study mainly analyses the practices of the best-performing hotels from different regions. The methodology passed through several stages, as discussed below, first discovering how identify the best cases, then developing the typologies of best practices, and developing a typology matrix of the HGSCM strategy.

Identifying the best cases

Nine were chosen from the 72 cases identified as best cases. These nine cases were located in different regions around the world. The detailed procedure of selecting the cases was as follows:

- Identifying the hotels that published their sustainability reports via the GRI (global reporting initiatives) database and followed the GRI rigid standards in reporting their sustainability and green practices. The data was retrieved for 4- and 5-star rated hotels. The total number of cases with complete data was 47.
- To include the case in the sample pool, it had to have a 4-or 5-star rating, since the top-rated hotels are more concerned about adopting green initiatives because of their significant environmental impact; 5-star hotels, for example, consume most energy (Gössling & Lund-Durlacher, 2021). More advanced technologies to control energy and emissions are widely used by the top-rated hotels (4-stars and 5-stars) (Erdogan & Baris, 2007). Moreover, all cases had to report their performance over the extended period 2017–2019. The start of the time series was chosen as 2017 since this was the first year after the adoption of modified reported standards announced by GRI, and the period was determined to end by 2019 since it was the last normal operating year before the COVID-19 pandemic.
- The performance of the cases as reflected in the green indicators of HGSCM was traced over the time series by computing the percentage of change over the period.
- The cases were ranked according to green performance from higher to lower under each green indicator. Only the top-ranked cases were selected for the further analysis to find the typologies. The final list of 9 cases comprised two from Asia, four from Europe, two from North America, and one from South America.

Identifying the actions taken by the best cases

The list of actions taken by the best cases over the period 2017–2019 was identified by reviewing the sustainability reports. The actions taken under each green indicator by the best cases were

identified. The list of proposed actions and actions categories to adopt were identified from the framework developed by Migdadi (2022). The actions were summarized as reported by the cases in the reports.

Developing the typologies

The typology represents an ideal type of strategy that was adopted by the top-ranked cases and led to the best green performance. Figure 1 shows the general process of developing the typologies of the HGSCM strategy that were adopted by this study. The following procedures were the ones that were adopted.

1. These typologies were generated as follows: first, the taken actions categories and achieved green indicators were identified.

For example, case (C1) took actions related to the following processes categories:

Upstream actions (hotel green procurement management), and midstream actions (hotel internal green process design, and hotel green quality management and internal commitment).

The best green performance indicator achieved by this case was the level of GHG emissions.

2. Then the cases were classified into groups according to the shared action categories between cases along the supply chain, upstream, midstream, downstream and reverse logistics.

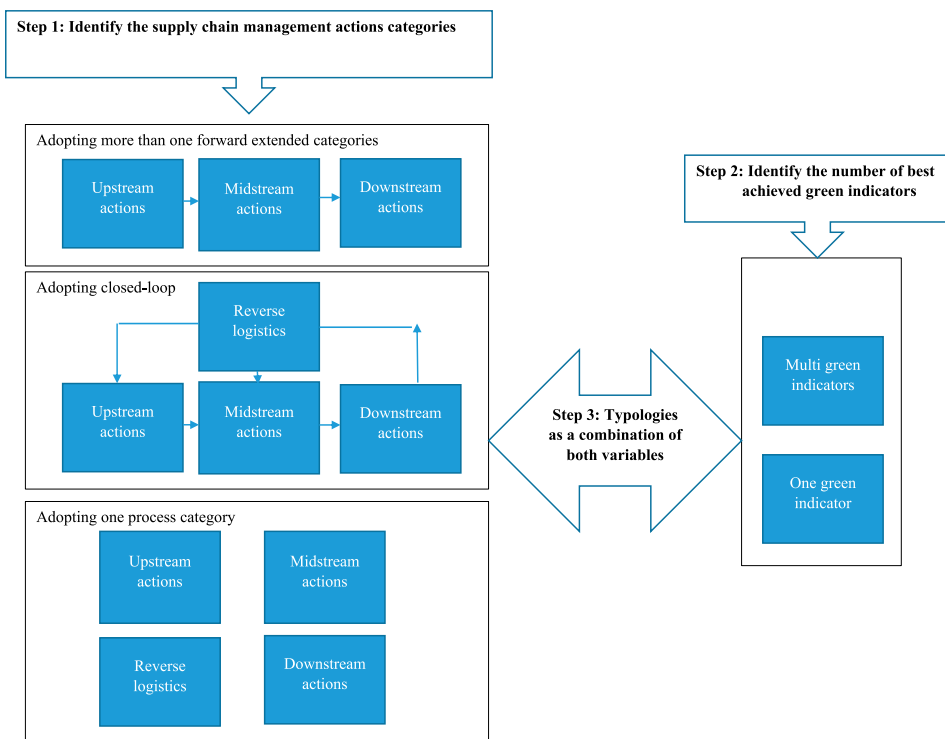


Figure 1. The adopted approach in developing the typologies of hotel green supply chain management strategy.

For example, cases C1, C2, C3, C4 and C7 took actions related to upstream, midstream and downstream, while cases C5 and C6 took actions related to midstream. C8 took action related to upstream, midstream and reverse logistics. C9 took actions related to reverse logistics only.

3. Next, the cases were reclassified according to the number of shared performance dimensions, whether one dimension or more than one.

For example, cases C1, C2, C3 and C4 achieved only one green indicator, but C7 achieved several.

4. The typologies were developed according to the previous classification attributes of actions and green indicators as follows:

- Forward extension of supply chain actions across more than one process category of the supply chain and achieved only one best green indicator. In these cases, the typology is called focused forward. This applies to C1, C2, C3 and C4.
- Forward extension of supply chain actions across more than one process category, also adopting reverse logistics actions, and achieving only one green indicator. This typology is called focused closed-loop. This is the case with C8.
- Forward extension of supply chain actions across more than one process category of the supply chain and achieved more than one best green indicator. In these cases, the typology is called differentiation forward. This is the case with C7.
- Adopting one forward action category (midstream) and achieving only one green indicator. This typology is called focused midstream. This is the case with C5 and C6.
- Adopting only reverse logistics actions and one green indicator. This typology is called focused reverse logistics. This is the case with C9.

Developing the typologies matrix of the HGSCM strategy

This matrix was developed according to the two characteristics discussed above. The first dimension of the matrix is the extension of the supply chain. The general classification scheme of the supply chain processes according to the flow is upstream, midstream, downstream and reverse logistics (Abbey & Guide, 2018). Accordingly, the green supply chain management actions could be restricted to one of these three processes, in which case it would be called an un-extended supply chain, or it could cover more than one process along the supply chain, in this case, called an extended one (McCormack & Kasper, 2002). If the management actions extended over the upstream, midstream or downstream processes, the supply chain flow is forward, and if the actions are extended in one or more of the forward processes and reverse logistics the flow is called closed-loop (Pala et al., 2014). The second dimension is related to the number of green indicators achieved. If the case achieves one indicator, it is called a focused performance, but if it achieves more than one green indicator and it is called differentiation.

Identifying the typologies of the HGSCM strategy

Table 1 shows a summary of the green action categories and green performance dimensions adopted by the best-performing cases. The number of generated typologies is five, as presented in the first column. The first typology was adopted by four cases, whose actions related upstream, midstream and downstream. Accordingly, these cases extended their green practices from suppliers by adopted green procurement management actions to promote internal process design, quality management and customer relationship management. Each one of these cases adopted one green performance dimension: GHG emissions by the first case, energy by the second and fourth,

Table 1. The adopted typologies of hotel green supply chain management strategy.

Proposed typologies	Supply chain processes flow					Green performance dimensions					
	Actions category Case	Upstream Hotel green procurement management	Hotel internal green process design	Midstream Hotel green quality management and internal commitment	Downstream Hotel green customers relationship management	Reverse logistics Hotel green reverse logistics management	GHG emission	Energy	Water	Waste	Recycling
Typology1: Focused forward	C1	YES	YES	YES			YES				
	C2	YES	YES	YES				YES			
	C3	YES	YES			YES			YES		
	C4	YES		YES				YES			
Typology2: Focused midstream	C5		YES	YES			YES				
	C6			YES			YES				
Typology3: Differentiation forward	C7	YES		YES			YES	YES	YES		
Typology4: Focused closed-loop	C8	YES	YES	YES		YES					YES
Typology5: Focused reverse logistics	C9					YES				YES	

and water by the third. Accordingly, this typology is called focused-forward. It is called focused since the cases achieved only one green performance dimension, and called forward, because the green actions extended from upstream to midstream and downstream.

The second typology was adopted by two cases, whose actions were related to midstream. Only one green performance indicator was achieved by these cases, and hence this typology is called focused-midstream. The third typology was adopted by one case; it shared action categories with the first group, whose actions are related to green procurement management and quality management. However, the number of green actions adopted was different. The number of green indicators was three, namely, GHG, energy and water. Thus, this typology is called differentiation-forward.

The fourth typology was adopted by one case, the actions taken related to upstream, midstream and reverse logistics; accordingly this case adopted closed-loop supply chain management. Moreover, it achieved best performance in the recycling indicator, and for this reason is called a focused closed-loop. The last typology was adopted by one case. Only one action category was adopted, which was reverse logistics, and one green indicator was achieved, which was waste. Hence, this typology is called focused-reverse logistics.

Focused-forward typology

Three typologies of the focused-forward strategy were adopted. Figure 2 shows the matrix of first focused-forward typology; according to this typology, the best achieved green indicator is GHG emissions. The actions taken were related to the green procurement of energy, green management processes of guests' departure and arrival and environment-controlling systems and facilities.

Figure 3 shows the matrix of the second focused-forward typology; this typology seeks to reduce energy consumption, it shares all action categories with the first typology, but has one more category, namely a green quality management system. The first typology is to make more actions

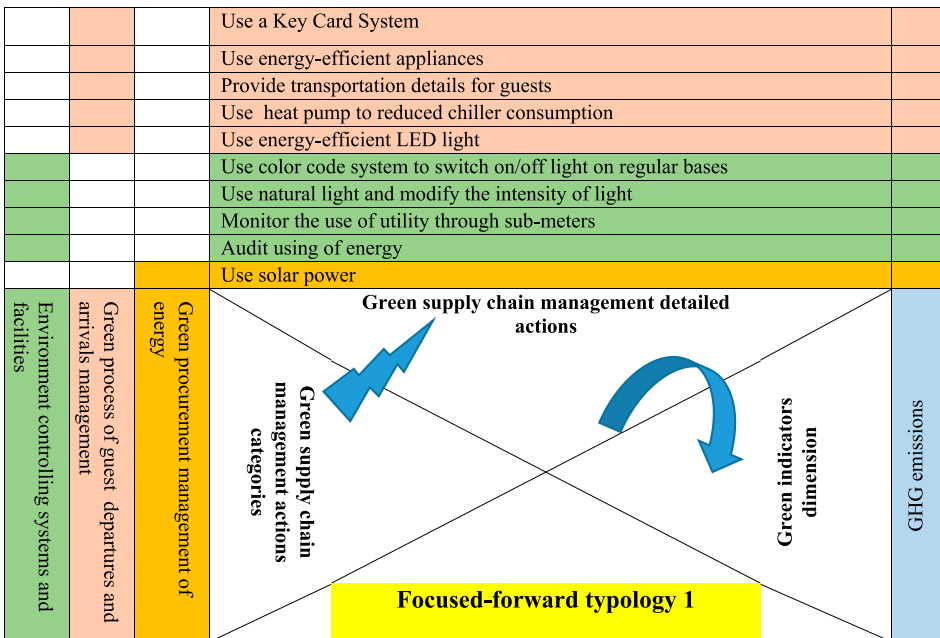
			Use a Key Card System	
			Use energy-efficient appliances	
			Provide transportation details for guests	
			Use heat pump to reduced chiller consumption	
			Use energy-efficient LED light	
			Use color code system to switch on/off light on regular bases	
			Use natural light and modify the intensity of light	
			Monitor the use of utility through sub-meters	
			Audit using of energy	
			Use solar power	
Environment controlling systems and facilities	Green process of guest departures and arrivals management	Green procurement management of energy		GHG emissions

Figure 2. Matrix of focused-forward typology 1.

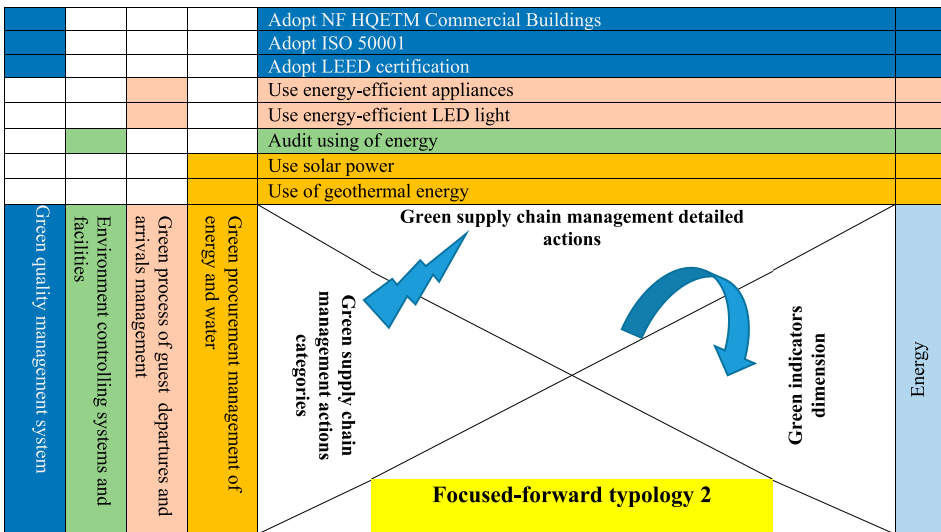


Figure 3. Matrix of focused-forward typology 2.

related to green management audit processes for guests’ departure and arrival and to environmental controlling systems and facilities. These two typologies are extended over the upstream and midstream processes of the supply chain.

The last forward-focused typology seeks to achieve lower water consumption (see Figure 4). This typology shares the first and second category of supply chain actions with previous typologies, which are the green procurement of water, and green management processes for guests’ departure and arrival. It also includes more action categories related to the green procurement management of products, green housekeeping process management, and customers’ awareness management. The previous typologies require investment in environmentally friendly technologies.

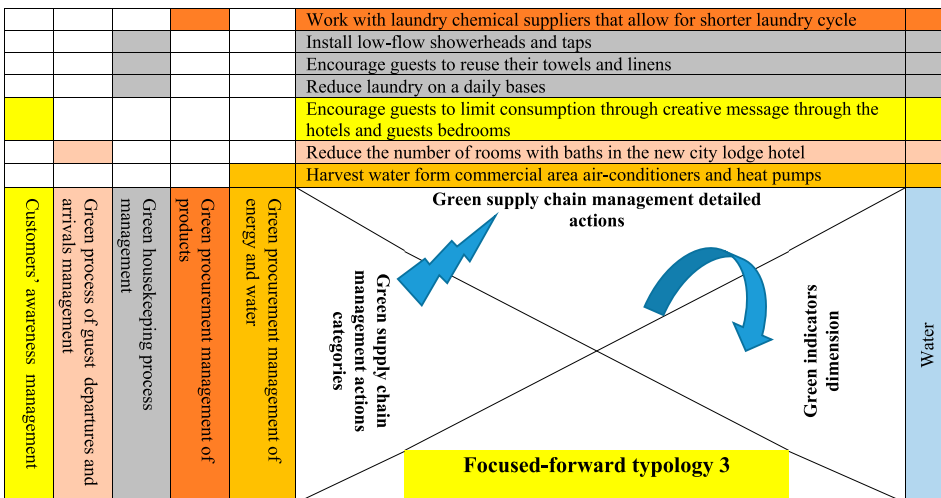


Figure 4. Matrix of focused-forward typology 3.

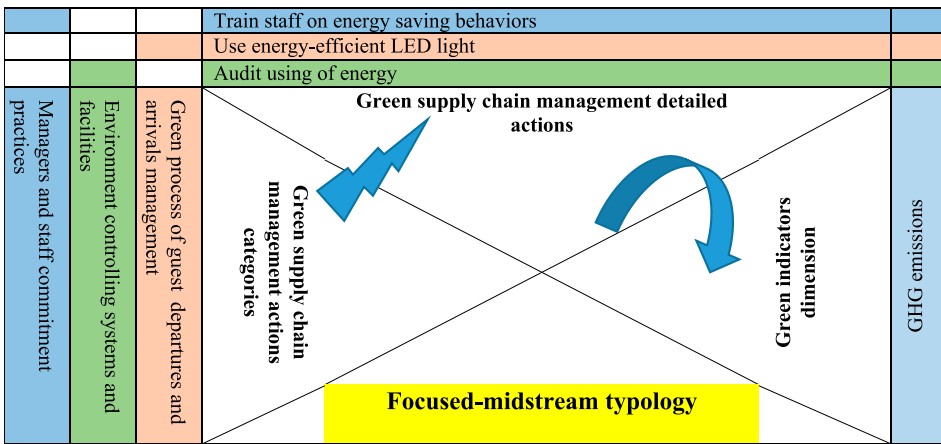


Figure 5. Matrix of focused-midstream typology.

Focused-midstream typology

Figure 5 shows the matrix of focused-midstream typology. It can be seen that the actions taken were related to green management processes of guests’ departure and arrival, environment controlling systems and facilities, and green quality systems. This typology achieved a GHG green indicator, and shared actions and action categories with focused-forward typologies 1 and 2, but the number of actions that were adopted was very small and did not require investment in technology or green quality systems.

Differentiation-forward typology

Figure 6 shows the matrix of differentiation-forward typology. It can be seen that the action categories adopted by this typology are the green procurement management of energy and water, environmental controlling systems and facilities, and a green quality management system. This typology achieved best performance in GHG emissions and water. One action, LEED certification,

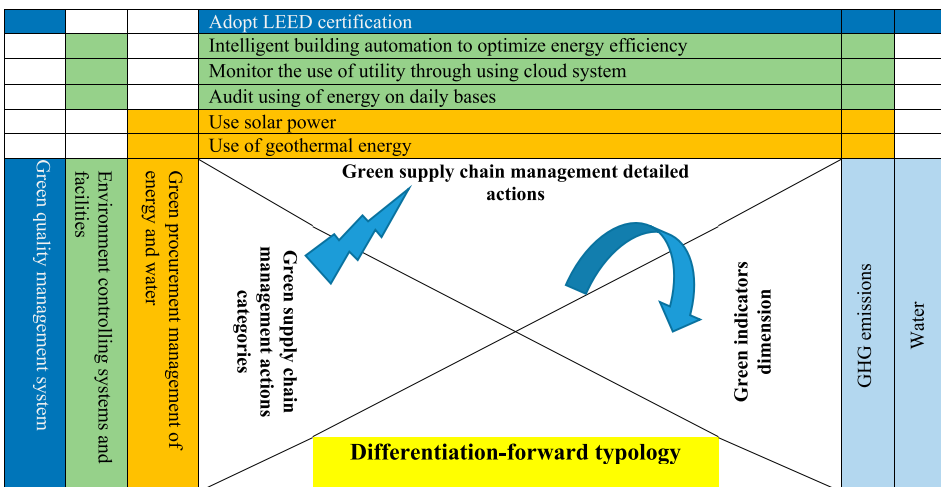


Figure 6. Matrix of differentiation-forward typology.

was shared with both green indicators. The action categories adopted by this typology are shared with focused-forward typologies 1 and 2, and shared with the action categories of focused-mid-stream. This typology is oriented more towards investment in green technologies as are the focused-forward typologies 1 and 2. This typology does not share the actions adopted to reduce water consumption with focused-forward typology 3, despite the reduction in water consumption achieved by focused-forward typology 3.

Focused closed-loop typology

Figure 7 shows the matrix of focused closed-loop typology. It can be seen that this typology adopted action categories related to upstream processes, such as the green procurement management of products, together with midstream processes, such as green housekeeping process management and environmental controlling systems and facilities, and adopted actions related to reverse logistics process, such as recycling processes. The green indicator achieved by this typology is recycling. The actions taken by this typology are related to green quality systems, adopting technology for waste water treatment and training employees in handling different types of waste. Accordingly, this typology requires investment in green technology, unlike focused-reverse logistics.

Focused-reverse logistics typology

Figure 8 shows the matrix of focused-reverse logistics typology. It can be seen that this typology adopted actions related to recycling, remanufacturing and upcycling. This typology focused on producing less waste. The actions taken by this typology require some capital cost for the technology to generate energy from wet waste, but the actions taken are more focused, and the processes require in general less capital and operating costs than focused closed-loop typology does.

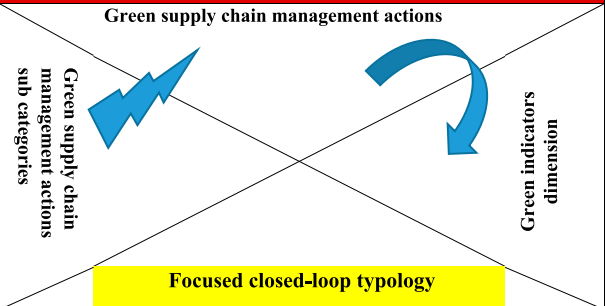
					Measures the share of waste that goes to recycling and the total kilograms of waste per guest night	
					Train employees to become familiar with the type of waste and their appropriate handling and disposal methods	
					Select all cleaning agents and detergents according to environmentally standards	
					Adopt HACCP standards	
					Adopt ISO 22000 Standards	
					Adopt the procedures for waste separation using the correct color coded bags and bins	
					Treat wastewater in the local wastewater treatment plant	
					Separate waste according to local authority guidance	
					Recycle glass, plastic, papers, lamps, electrical devices	
Recycling process	Environment controlling systems and facilities	Green Quality management system	Green housekeeping process management	Green procurement management of products	 <p>Green supply chain management actions</p> <p>Green indicators dimension</p> <p>Recycling</p> <p>Focused closed-loop typology</p>	

Figure 7. Matrix of focused closed-loop typology.

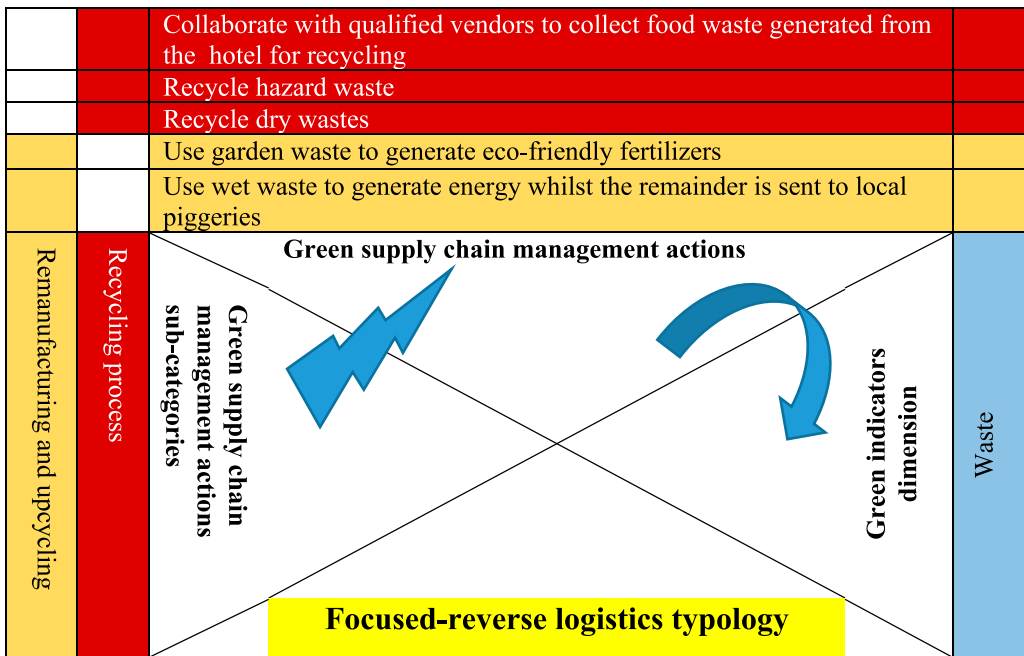


Figure 8. Matrix of focused-reverse logistics typology.

The typologies matrix of the HGSCM strategy

Figure 9 shows the matrix of HGSCM strategy typologies. This matrix has two dimensions, the first of which, located on the horizontal axis, is called the degree of supply chain extension, while the vertical axis shows the number of green performance indicators adopted. According to this matrix the proposed typologies total 12. These typologies are as follows.

Degree of extension \ Number of green performance indicators	Un-extended One process of supply chain	Extended More than one process along the supply chain
Differentiation Multi- green indicators	Differentiation-upstream Differentiation-downstream Differentiation-midstream Differentiation -reverse logistics	Differentiation-forward Differentiation closed-loop
Focused One green indicator	Focused-upstream Focused-downstream Focused-midstream Focused-reverse logistics	Focused-forward Focused closed-loop

Figure 9. Typologies matrix of hotel green supply chain management strategy.

Focused-reverse logistics: focused on one green indicator, whether waste or recycling, and taking action related to recycling, upcycling and recycling.

Focused-midstream: focused on one green indicator related to GHG, energy, water, waste and recycling, and taking action related to one or more action dimensions, such as the green arrival and departure of guests, green housekeeping, green food and beverage processes, and green quality management and internal commitment.

Focused-downstream: focused on one green indicator and taking actions related to guests' involvement in green initiatives.

Focused-upstream: focused on one green indicator, and taking actions related to one or more action dimensions, such as green supply processes for vegetables and fruits, green supply processes of foods and drinks, green supply processes for equipment, materials and furniture, green supply processes for products, green supply processes for water and energy, green supply processes for training and development.

Differentiation-reverse logistics: achieving indicators related to waste and recycling, and taking actions related to one or more action dimensions, such as recycling, upcycling and reusing.

Differentiation-midstream: achieving more than one green indicator, and taking actions related to one or more action dimensions, such as the green arrival and departure of guests, green housekeeping, green food and beverage processes, and green quality management and internal commitment.

Differentiation-downstream: achieving more than one green indicator related to GHG, energy, water, waste and recycling, and taking actions related to guests' involvement in green initiatives.

Differentiation-upstream: achieving one or more green indicators, and taking actions related to guests' involvement in green initiatives.

Focused closed-loop: focused on one green indicators and making combinations of actions related to reverse logistics, plus actions related to one or more processes of upstream, midstream and downstream.

Focused-forward: focused on one green indicator and making combinations of actions related to one or more processes of upstream, midstream and downstream.

Differentiation closed-loop: achieving more than one green indicator, and making combinations of actions related to reverse logistics, plus actions related to one or more processes of upstream, midstream and downstream.

Differentiation-forward: achieving one or more green indicators, and making the combination of actions related to one or more processes of upstream, midstream and downstream.

However, only five typologies were adopted by the best cases of this study. These typologies are differentiation-forward, focused-forward, focused closed-loop, focused-midstream and focused-reverse logistics. Accordingly, most of adopted typologies are focused on.

Discussion

The number of typologies generated by this study as presented in the typologies matrix in [Figure 9](#) was 12 and the number adopted as presented in [Table 1](#) was five. The previous studies generated different numbers of typologies. Some studies generated six (e.g. Narasimhan et al., 2008), four (e.g. James, 2018; Wells & Seitz, 2005), some three typologies (e.g. Difrancesco & Huchzermeier, 2016; Whipple & Russell, 2007) and others two (e.g. Usama & Ramish, 2020).

This study is empirical, whereas most previous studies have been theoretical (e.g. Difrancesco & Huchzermeier, 2016; James, 2018; Wells & Seitz, 2005; Whipple & Russell, 2007). This study used two widely shared attributes that adopted by previous studies. Some previous studies adopted one attribute (e.g. Difrancesco & Huchzermeier, 2016; Whipple & Russell, 2007), others adopted two (e.g. Wells & Seitz, 2005; James, 2018) and a few adopted multiple attributes (e.g. Narasimhan et al., 2008).

The largest number of adopted typologies focused on achieving lower GHG emissions or energy consumption. This reflects a deep concern about reducing GHG emissions and energy consumption,

since the hotel industry reveals the most intensive use of energy in the hospitality sector (Cingoski & Petrevska, 2018; Mak & Chang, 2019). It is ranked fifth in its energy consumption of all tertiary buildings (HES, 2011).

The vast number of typology actions are related to preventing rather than mitigating pollution. This supports the pollution prevention and stewardship capabilities of the NRBV. Firms, which have this in mind, take the initiative and act along the value chain of product lifecycle to prevent waste and emissions rather than cleaning them up (Hart, 1995; Hart & Dowell, 2011).

The focused-forward typologies 1 and 2 as presented in Figures 2 and 3 share most actions and action categories, but typology 1 adopts more actions and action categories than typology 2, since the performance indicators achieved by both typologies (GHG emissions and energy) are related. Moreover, the companies adopting typology 1 could move towards typology 2 by adopting more actions related to green quality management systems. If a hotel management wants to perform better under different green indicators it is recommended to adopt LEED certification. In this case, the focused-forward typology 1 will be transformed to a differentiation-forward typology and perform better in GHG and energy.

Focused-forward typology 3 shares action categories related to green procurement and the management of guests' arrival with focused-forward typologies 1 and 2, but has more action categories related to midstream and downstream, because the performance indicator achieved was water consumption. The three typology options of focused-forward require more investment in environmentally friendly technologies, and good experience in installing and operating them. Accordingly, these typologies could be adopted as mature typologies by hotels after some time spent in adopting such preliminary typologies as focused-midstream.

Focused-midstream typology, as presented in Figure 5 shares actions and action categories with focused-forward typologies 1 and 2. This typology achieves the same indicator as typology 1 and an indicator related to typology 2. Moreover, the number of adopted actions is very limited and it does not require investment in technology or green quality systems. Accordingly, this typology could be adopted by hotels that have only a limited budget for green initiatives but are looking for a significant impact over a short period. The hotels adopting these typologies can move towards using focused-forward 2 in the future, if more of their budget is allocated to green initiatives.

Differentiation-forward typology, as presented in Figure 6, requires investment in green technology and accreditation. Accordingly, to adopt this typology requires more capital and operating expenses than focused-midstream does. Moreover, it is easier for the hotels that adopt focused-forward typology 1 to move towards differentiation by adopting LEED certification. Furthermore, the hotels, which adopt focused-forward typology 2, share most actions and action categories with this typology, but the indicator that was achieved was energy. The differences in achieved performance indicators could be related to the indirect impact of other actions taken by differentiation-forward typology, such as monitoring the use of a utility by means of a cloud system, or intelligent building automation to optimize energy efficiency, but this requires further investigation by future studies.

Focused closed-loop typology, as presented in Figure 7, costs more than focused-reverse logistics typology as presented in Figure 8. This occurs because the extension along the supply chain requires more actions to be taken in relation to the different processes along the supply chain. Accordingly, if a company has limited financial resources and is looking to achieve a good performance in terms of waste management it is more appropriate to adopt focused-reverse logistics. Yet, despite the adoption of many actions along the supply chain by focused closed-loop typology, the outcome is focused on recycling, because all the actions taken along the supply chain affect recycling directly.

As discussed above, some typologies adopted green innovative technologies and practices. Green innovation plays a crucial role in achieving better environmental and operational performance (Gürlek & Koseoglu, 2021). The green innovation practices are classified into process-oriented and product-oriented (Arici & Uysal, 2022). Focused-forward typology 2 and differentiation-forward adopted geothermal energy and solar power as innovative green processes.

Focused-forward typology 3 adopted harvesting water from commercial area air-conditioners and heat pumps, and encouraging guests to limit consumption through creative message through the hotels and guests bedrooms. Differentiation-forward typology adopted intelligent building automation to optimize energy efficiency and monitored the use of utility through using cloud system. Wet waste was used to generate energy by focused-reverse logistics typology.

Innovative products were adopted by some typologies, for example, using energy-efficient appliances and energy-efficient LED light by focused-forward typology 2. Moreover, focused-forward typology 3 hotel worked with laundry chemical suppliers to allow for shorter laundry cycle, and installing low-flow showerheads and taps.

Conclusions, implications, limitations and future research

Most conceptual frameworks developed by previous studies have been general since they covered the hospitality sector, not hotels in particular, and most studies have focused on studying the internal processes of the hotels. Most typology studies have focused on developing typologies related to particular processes or practices of the supply chain; for example, the typologies of closed-loop supply chain management, typologies of remanufacturing, the typologies of actors involved in closed-loop supply chain management, typologies of configuring RFID in closed-loop and reverse logistics supply chain. Very few studies have developed typologies covering different practices or processes along the supply chain. This is one of the rare studies that have developed typologies covering all possible green supply chain management strategy action categories and all aspects of green performance.

This study generated 12 typologies in theory, but those adopted by the best-performing cases numbered five. Most adopted typologies were focused on achieving better emissions and energy performance; moreover, they were flowing forward. The lowest number of typologies achieved several green indicators: reverse logistics, closed-loop and midstream.

This study contributes significantly to our theoretical knowledge of green supply chain management and HGSCM in particular. The generated typologies represent a mid-range theory, which helps to understand what practices are the best to adopt. This study will help the academics in this field in teaching this issue and help scholars in developing hypotheses for future research by adopting the proposed framework for developing typologies. Managers will have a deeper understanding of the critical success factors along the supply chain to achieve the most competitive green performance. The matrices related to each typology represent a strategy road map that could be adopted, and the generated matrix for all typology alternatives could be used a general guide to choosing a strategy.

Despite the theoretical significance of this study in understanding this phenomenon, it was based on attributes related to the supply chain itself. Future studies can adopt more factors, such as the amount of resources available, the degree of collaboration with stakeholders, and the economic and market performance indicators. The results of this study represent a mid-range theory, which needs to be examined by conducting a survey study of a large sample before it can promise more support for the best practices.

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