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Impacts of quality management principles in supporting sustainable development in the Mauritian hospitality sector

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Abstract: The notion of sustainability has greatly evolved since the 1960s. As the global population is increasing along with the consumption rate, it is becoming urgent to alleviate the negative impacts of this growth while, in parallel, allowing for continuous enhancements in environmental quality and overall living standards. This is where the need for sustainability becomes apparent. This research focuses on the hospitality industry, one of the top pillars of the Mauritian economy, which has expanded drastically during the last two decades. The study aims at assessing sustainability practices through an investigation of the different sustainable practices adopted by the hospitality industry. A survey was conducted with the main stakeholders in the hotel industry. The outcome of the survey, including an overview of the gaps faced by the hotels during their sustainability system implementation or maintenance, contributed to designing a framework linking quality and sustainability. The survey revealed that most hotels possess sustainability certifications. It was noted that more than 80% of the respondents calculate or estimate their CO₂ emissions, and that around the same percentage of interviewees use the LCA technique. Further, this study depicts that hotels in Mauritius have started their sustainability journey, which is a positive sign. To help the industry overcome barriers to Sustainable Development (SD), it is recommended to use and include quality management as a tool to support and enhance overall efficiency.

Keywords: sustainability; sustainable practices; hospitality industry; quality management principles; Mauritius

1. Introduction

The concept of sustainability was devised explicitly to indicate that it was feasible to attain economic growth and industrialization without damaging the environment [1]. The population has grown fast since then, and productivity has progressed. The preservation of the world's life support systems has become increasingly challenging because of the quick and continual environmental changes produced by humans [2]. The tourism sector in Mauritius contributes significantly to economic growth and acts as a vital driver in the country's overall development [3].

However, due to COVID-19 and the implementation of several containment measures like travel bans, closed borders, and quarantine periods, the tourism industry has been the most negatively impacted. Mauritius was no exception. Before the lockdown, the island was already showing signs of the pandemic's damaging effects on tourism. The virus forced several hotels, travel companies, and guesthouses to close for a prolonged period, in addition to lowering travel moods throughout the world. The situation worsened during the initial Mauritius shutdown in 2020. According to Statistics Mauritius, overall visitor arrivals plummeted by 68.6% in 2020 compared to the same time in the previous year; those arriving by air decreased

by 70.9%, while those arriving by water increased by 16.2%. Revitalizing the industry will need coordination and coordinated measures throughout the whole travel and tourism ecosystem [4]. Sustainability was characterized in the Brundtland Report as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ [1]. The approach to business sustainability emphasizes the need to consider economics, the environment, and equity when making company choices [5].

Companies are thus making substantial changes in how they create, produce, and distribute products and services to their consumers as there is an increase in expectations for change [5]. To allow the tourist sector to recover and reimagine the prospect of tourism in a new post-COVID-19 climate, policymakers must begin focusing on an action plan and a long-term strategy [4]. Uncontrolled tourism expansion can result in major consequences such as cultural and environmental deterioration, the destruction of vulnerable ecosystems, and pollution, to name a few [6].

Studies have outlined the effects of adopting management strategies linked to the Quality Management (QM) paradigm and their potential benefits for company sustainability and environmental management. The goal of quality development is to meet and exceed customer requirements while also improving efficiency, i.e., how to provide more customer value with fewer resources. Sustainability might be addressed in a practical way by incorporating the information and approach used in high quality work into sustainability initiatives [7].

The aim of this study is to identify and analyse the various sustainable practices adopted by 3 to 5-star’ hotels in Mauritius and recommend a framework using quality management principles to help the organisations overcome the obstacles they are facing in developing sustainability and achieving customer satisfaction. The objectives are as follows:

- 1) Investigate the different sustainable practices adopted by the hospitality industry with regards to the three dimensions of sustainability, namely, social, economic, and environmental.
- 2) Assessing the context in which sustainability practices benefit the hotels in Mauritius.
- 3) Identifying gaps or issues faced by the hotels that can prevent them from attaining their sustainability goals.
- 4) Designing a framework using quality management principles and dimensions of sustainability to help the hotels enhance their sustainability objectives.

2. Literature review

2.1. Three dimensions of sustainability

Governments modifying legislation and regulations, businesses engaging in voluntary social responsibility initiatives based on conscious consumption, and consumers being educated to change their consumption patterns are all instances of a growth in the need for sustainability initiatives [8]. The challenge for current and future generations is to avoid or alleviate the negative impacts of this increase while simultaneously allowing for continuous improvements in environmental quality,

human health protection, and overall living standards [5]. The three-pillar concept of sustainability has gained widespread acceptance. This concept is generally represented as three intersecting rings with overall sustainability in the center, as shown in **Figure 1** below. ‘Sustainability’ is still a fluid notion with many different interpretations and meanings depending on the situation [9].

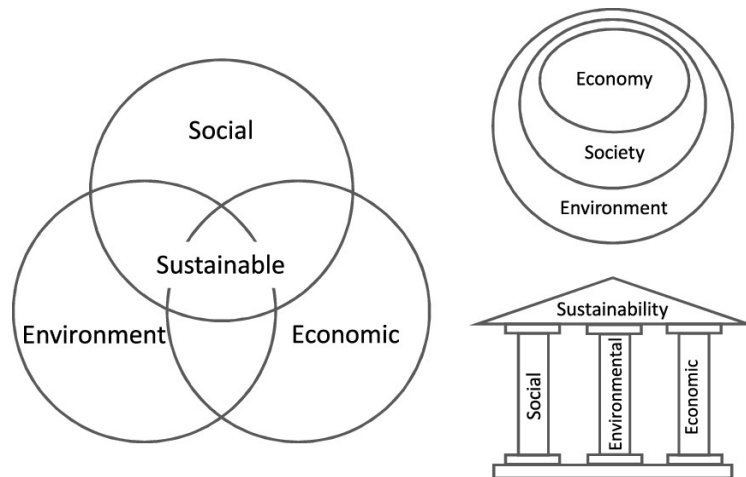


Figure 1. The 3 pillars of Sustainability illustrated [9].

2.2. Business sustainability

The triple bottom line concept is commonly used by businesses, governments, and NGOs to address sustainability challenges. Sustainability will have an impact on context, creativity, process, and the ability to persist [10]. Further, CSR is a rising idea in the larger framework of general business. Some argue that it is the business sector’s means of combining the economic, environmental, and social priorities of their operations, like the triple bottom line notion. The economy of this emerging century will be marked by a decline in the energy and material content of items and a rise in their intellectual content. Governments and businesses will have a challenge ensuring that economic growth is both environmentally and socially sustainable [5].

2.3. Sustainability in the hospitality industry

Tourism is one of the world’s largest, fastest-growing, and most promising industries, contributing to economic growth, job creation, and poverty reduction [3]. Notwithstanding the worldwide efforts aimed at managing the COVID-19 pandemic, a number of sectors, such as the hotel and tourism industries, have begun to regain their vibrancy. In fact, there is a growing and thriving demand for reservations and hospitality services [11]. The tourist industry, on the other hand, is now facing a variety of difficulties [3]. As per Chummun and Mathithibane [12], several studies have looked at the economic and social consequences of tourism in recent years, and it has gotten a lot of attention from academics. This is because tourism is one of the largest and fastest-growing sectors in the world, contributing 10% to global GDP and fostering the expansion of both official and informal businesses. Tourism has a large income multiplier impact in Small Island Developing States (SIDS), producing economic activity and income in linked tourism-oriented hospitality, recreational, and transportation sectors.

The behaviour of customers and decision-makers is now significantly influenced by the sustainability of the hospitality and hotel industries. Due to rising supply chain operating costs, state environmental restrictions, community pressure, and customer knowledge and demand, hotels are under more pressure than ever to adopt green supply chain management. Energy use in the hotel sector of the tourism business is one of the highest. In addition, hotels use a lot of water. Hotels must therefore implement an environmental strategy more quickly than other firms in order to lessen or eliminate the negative effects of their operations on the environment [13].

Further, the previously mentioned author stated that a hotel that uses green techniques improves its standing, appeal, and value to guests more than other hotels do. Customers are more loyal, satisfied, and prepared to pay more. The tourism industry supports all 17 of the UN's sustainable development goals; in particular, it directly supports goals 8, 12, and 14. Sustainable tourism is securely positioned to advance the UN's post-2015 development ambitions, which ask for a defined implementation framework. Those growing concerns about several key difficulties and problems confronting society, ecosystems, and the economy at various geographical and temporal scales are reflected in a growing interest in sustainability. Continued population increase and urbanisation, as well as all the constraints, namely, natural resource use and food supply, climate change, rising levels of pollution, the loss of natural ecosystems, water stress, and shortages, resulted in an increase in consideration for the notion of sustainability, which is being considered as a possible solution. Designing green hotels, reducing energy consumption, technology innovation, sustainable tourism, and sustainable human resource management practices may contribute to sustainability [14].

Green customers are often characterized as those who engage in ecologically responsible consumer behaviours. Consumers may lessen their influence on the environment by cutting back on their consumption, using public transportation, recycling, buying products with fewer packaging, buying used goods, eating less meat, purchasing locally grown food, organic food, fair-trade goods, and other things [15].

Cingoski and Petrevska [16] stated that tourists have grown more conscious of and begun to think about novel, out-of-the-ordinary topics, such as environmental preservation, waste management, energy effectiveness, renewable energy, greenhouse gas emissions, etc. The management's main goal is to concentrate its efforts on cutting operational costs by implementing new energy sources and preserving the environment by developing an eco-friendly institution. Reducing operating expenses boosts revenue and enhances competition in the tourism industry. The adoption of energy-saving techniques enables improved visitor comfort, higher hotel aesthetic value, fewer maintenance system failures, and other benefits.

In the hospitality sector, the significance of providing high-quality service is widely acknowledged, as hotels cannot thrive in the fierce competition without meeting the needs of their customers. In order to provide high-quality services, a business must comprehend what the customers demand. Enhancing customer loyalty, growing market share, increasing returns to investors, cutting expenses, lessening

susceptibility to price competition, and creating a competitive edge are explained as the fundamentals of service quality [17].

In general, people have started looking for and willingly paying more for “green tourism” or “eco-friendly tourism” as opposed to simply choosing a straightforward, low-cost regular hotel that provides normal facilities. To effectively compete with the always-expanding competition, this entails beginning with the education and training of the hotel staff, then implementing a series of measures step-by-step to improve services, and eventually acquiring green or eco-certificates for the company [16].

Tourism must embrace sustainable practices that serve as conservation instruments and, among other things, enable the preservation of significant natural areas, wildlife, archaeological, and historical sites; more effective resource management; and enhanced community well-being through local investments [6]. As a powerful sector, the hotel industry must strike a balance between commercial interest and long-term viability. Second, they must overcome the threat of climate change, which they are extremely vulnerable to. Green Practice acts as a value-added business approach that helps hospitality businesses engage in environmental protection measures [15].

A challenging economic environment brought on by resource scarcity and population growth necessitates the incorporation of sustainability into all facets of the industry rather than treating it as a separate issue. The issues concerning climate change, global warming, air and water pollution, ozone depletion, deforestation, biodiversity loss, and global poverty must be thoroughly understood by every aspiring hospitality player [18].

Numerous large worldwide hotel chains are gradually highlighting their commitment to sustainability and incorporating it into their fundamental business strategy, even as they pursue further development that places a variety of demands on natural resources. Sustainability may be viewed as the objective or end of a process known as sustainable development [18]. Tourism must advocate for the protection and conservation of these resources, as well as educate tourists about their importance, indicating that they are unique and that their integrity must be preserved for future generations [6].

Destinations are pitching up to formulate brand-new rules to reconcile tourism and the environment through sustainable practices, which has also become a worldwide slogan as the movement of sustainable development and environmental challenges becomes textbook reality [15].

2.4. Linking Quality Management (QM) to sustainability

To exist, the company must satisfy several actors who can cause the company to collapse. However, there may be a gap in global sustainability since not all actors that are impacted by organizational actions have the tools and authority to alter it [19]. A cursory review of the literature will show that the notion of total quality management is dominated by two traditional ideologies. The first one is the operations-adherence perspective that is used to examine TQM. Further, the second method is the integration of dynamics, layouts, processes, and systems designed to

gain a competitive advantage [11]. Quality specialists may demonstrate how their improvement initiatives contribute to the organization's long-term success by reducing material usage, saving energy, conserving water, and so on. It is the most effective technique to demonstrate that environmental stewardship is not an expense but rather a potential for increased profit. Our environmental goal is to decrease the negative impact of the company's operations on the environment. It also demonstrates to the company that quality procedures and tools can be used to improve sustainability as well as quality. Quality may help with this action-oriented, operational sustainability in a variety of ways, and it can begin to be built into the company's management structure [20].

Quality is a wide, multi-interpretable, relative, and dynamic notion, like sustainability. The evolution of the quality approach reveals several elements that are pertinent considering the difficulties addressed [21]. TQM acknowledges leadership dedication to quality, customer orientation, and benchmarking. Additionally, the strategy acknowledges quality evaluation, product design visualization, employee training and development, and empowerment and involvement [11]. The goal of quality development is to meet and exceed customer requirements while also improving efficiency, i.e., how to provide more customer value with fewer resources. Sustainability might be addressed in a practical way by incorporating the information and approach used in high-quality work into sustainability initiatives. Thus, the environment, social responsibility, and the economy are all [7]. **Table 1** shows a list of hotel groups based in Mauritius and a brief overview of the sustainability initiatives being taken by them.

Table 1. List of hotel groups and the sustainability initiatives being taken.

Hotel groups (Based in Mauritius)	Sustainability initiatives taken
A	Triple bottom line approach including environmental, social and financial aspects of sustainability
B	Developed a sustainable management plan that comprises of the following: environmental, socio-cultural, Quality, Health and Safety
C	Developed a comprehensive and inclusive strategy based on the UN SDGs. The latter comprises of social, environmental, and economic aspect of sustainability. Success is tracked through KPIs
D	Developed a substantial action plan based on zero-single use plastic waste. This allowed for the promotion of environmentally friendly substitution.
E	Efficient waste, water and energy management system. Some of the actions taken were to recycle wastewater for irrigation purposes and implementing awareness programs
F	Alignment with the UN SDGs, the hotel group has included through a map, their collaboration with their stakeholders

Adapted from: Sun resorts [22], Constance Hotels [23], Hotels Attitude [24], Beachcomber hotels [25], Veranda Resorts [26], and Lux Resorts [27].

3. Methodology

To achieve the aim of this research work, a questionnaire was designed for knowledgeable staff in the hotel industry with regards to sustainability. The objectives of the survey were to:

- 1) Investigate the different sustainable practices adopted by the hospitality industry with regards to the three dimensions of sustainability, namely, social, economic, and environmental ones.

- 2) Assessing the context in which sustainability practices benefit the hotels in Mauritius.
- 3) Identifying gaps or issues faced by the hotels that can prevent them from attaining their sustainability goals.
- 4) Propose or recommend improvement areas that can benefit the hospitality industry in Mauritius.

3.1. Sampling and design of the questionnaire

A list of hotels rated 3 to 5 stars was available on the Mauritius Tourism Authority website. A total of 11 hotels across Mauritius were surveyed, and most of the hotels were part of the main hotel groups. The questionnaire for this research work contained mostly closed-ended questions and some open-ended ones. A brief description of the sections is outlined below in **Table 2**.

Table 2. Description of the different sections in the questionnaire.

Section	Title	Brief description
A	Characteristics of hotel	<ul style="list-style-type: none"> • Name, address, number of employees, classification, certification.
B	Environmental Domain	<ul style="list-style-type: none"> • Energy Consumption and Conservation. • Waste handling, Disposal, and Reduction. • CO₂ and Greenhouse gases emissions. • Environmental certifications and accreditation. • Environmental Activities and Awareness. • Water consumption, saving, and Recycling.
C	Social Domain	<ul style="list-style-type: none"> • Customer service. • Employees' welfare. • Hotel's involvement with local businesses. • Hotel's initiative with regards to sustainability.
D	Economic Domain	<ul style="list-style-type: none"> • Customer rate trend with regards to sustainability initiatives or certifications. • Hotel's energy consumption costs. • Trend in operating costs and returns on investments. • Customer complaint trend.
E	Sustainable development initiative	<ul style="list-style-type: none"> • Overview on the different sustainable development initiatives, their benefits, the issues faced and how they are tackled.
F	Profile of respondents	<ul style="list-style-type: none"> • Contact details of respondents, position in hotel, education level, years of experience.

3.2. Pilot testing

A pilot test was carried out with 8 respondents. The comments or feedback of the respondents were taken into consideration. It allowed the revelation of potential misunderstandings, thus giving the opportunity to make necessary amendments to bring improvement to the questionnaire.

3.3. Statistical analysis

The results obtained through the questionnaire will be later analysed using Statistical Package for the Social Sciences (SPSS) 16.0 and Microsoft Excel 2013. The data was transformed into frequencies, charts, and tables. Moreover, further analysis was conducted, namely, Spearman's correlation tests, median, and mode.

3.4. Framework design

The purpose is to review, synthesize, and refine current literature and propose a framework that will link quality and sustainability. The aim is to help the hotel industry in Mauritius overcome various limitations they may encounter in the development of sustainability practices. The limitations were assessed through the survey questionnaire. Incorporating the knowledge and technique from Quality Management (QM) and systematic improvements into an organizational component, might provide new options to succeed in establishing long-term sustainability in a wider sense [7].

QM is defined as a philosophy of practices, principles, and tools, according to one of the most prevalent definitions. The main ideas of QM include continual improvement and customer focus. Furthermore, buyers may regard care for or consideration of sustainability as a need. The goal of QM is to increase the efficiency of organizational operations and remove defects. Specific practices like ‘zero defects’ are inextricably linked to the environmental management-based system’s ‘no waste’ aim. Furthermore, there is a similar focus on making better use of inputs. Organizations that have embraced QM methods may encourage and build a set of abilities that assist the adoption of sustainable practices because of these commonalities [28].

3.5. Constraints

The main challenge faced during this research work was getting responses from the hotels. To overcome this constraint, a focus was placed on major hotel groups in Mauritius, where sustainability initiatives emanate from the head office before being cascaded down to the individual hotels.

4. Results

The result section depicts the key findings following data collection. The latter have been presented in the form of charts, tables, and figures derived from statistical analysis. **Figures 2** and **3** demonstrated that most of the data collected were from the north and east of Mauritius (36.4% and 36.4%).

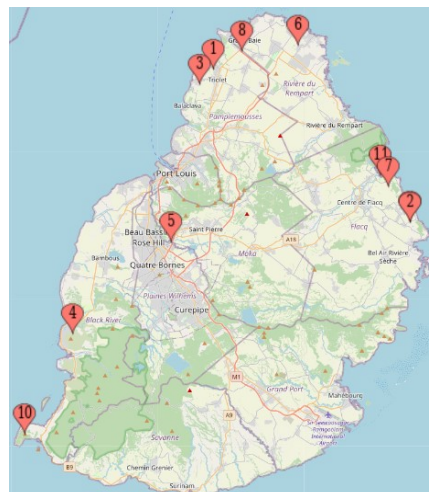


Figure 2. Locations where data were collected.

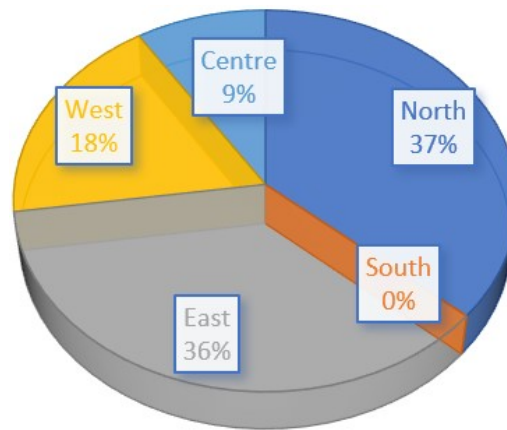


Figure 3. Locations where data were collected.

Most of the respondents’ forms are part of major hotel groups in Mauritius, comprising individual hotels and resorts throughout the island.

Most of the hotels interviewed have certifications related to sustainability, namely, Earthcheck (27%), Green Globe (18%), and Travel Life (9%). Some hotels also have several certifications active. For instance, one of the interviewees stated that they possess the following: Green Key, The Pledge on Food Waste, Gold Distinction, and the Sustainable Tourism Awards 2022.

Several questions were asked about the energy consumption and conservation of the hotel groups. It has been recorded that usage of renewable sources of energy is prevalent among the respondents (54.5%). Moreover, the same goes for the implementation of measurable targets for the conversion towards more energy-efficient practices (63.6%). All the respondents agreed about the preference of the hotel to buy green-labelled, energy-efficient, and water-saving labelled products (81.8% strongly agreed).

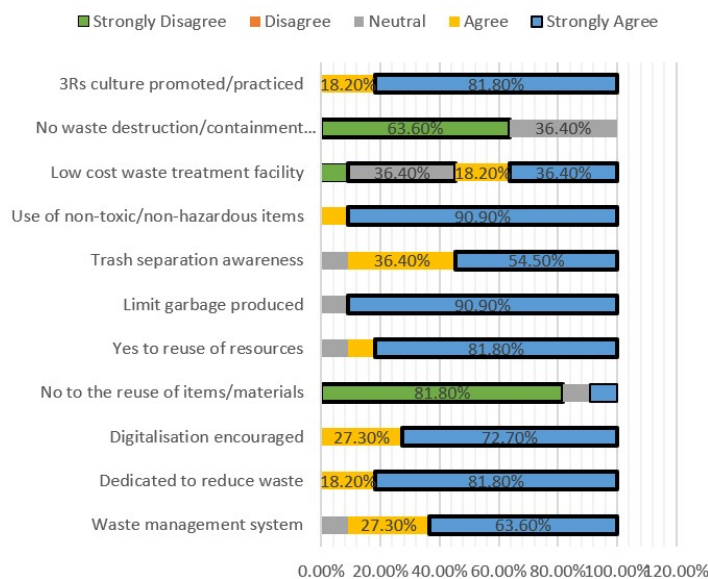


Figure 4. Responses on waste handling, disposal, and reduction.

A series of questions were then asked about the management of waste. The results were quite positive, as indicated in **Figure 4**. It was recorded that waste

management systems are well established and that 3R culture is promoted (100% agreed, 81.8% strongly agreed).

Figure 5 indicates one of the most positive responses recorded during the survey. It was noted that environmental initiatives are well established within the hotels. Awareness on environmental stewardship is raised, and employees are encouraged to engage themselves in sustainability activities being organised (>90% strongly agreed). All the respondents agreed on the hotel's website that detailed actions were undertaken as part of their environmental sustainability programs (90.9% strongly agreed). Further, 72.7% of the respondents strongly agreed about having a routine procedure to inform the clients about their environmental sustainability policies (ESP).

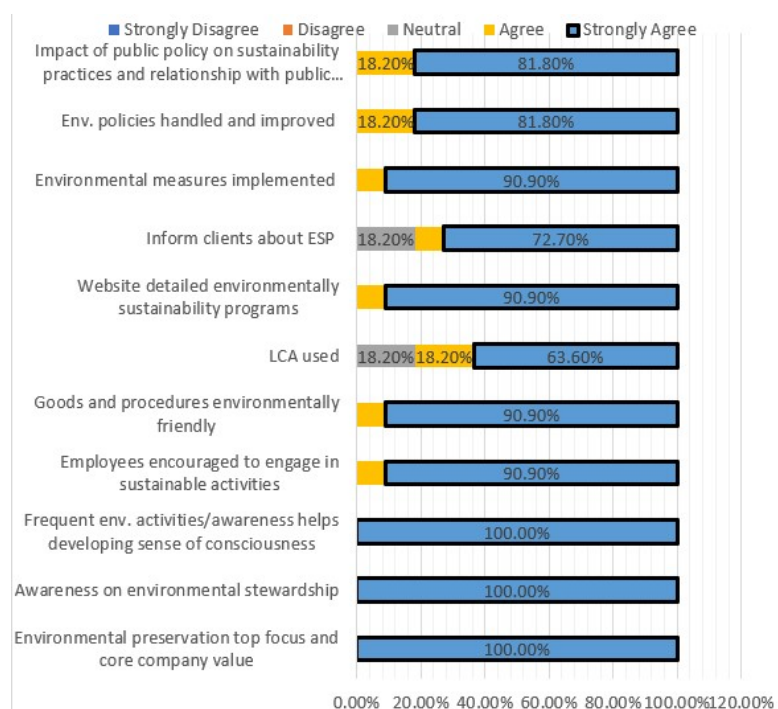


Figure 5. Responses on environmental activities and awareness.

The respondents were asked if the hotels had established a CSR policy. 63.6% strongly agreed, and 27.3% agreed. With regards to a potential increase in occupancy rates following the implementation of sustainability efforts, 45.5% and 27.3% strongly agreed and agreed to this statement. The respondents were then asked whether the number of satisfied guests had increased in recent years and if loyalty and reward programs were made available to them. The highest percentage was checked for strongly agree and agree points (45.5% and 36.4%, respectively). Furthermore, when asked if customers are willing to pay more for programs that promote sustainability, 54.5% were neutral about it, and 45.5% strongly agreed.

Moreover, it was asked if the hotels have improved their cost-cutting through process innovation, green supply chain design, and enhanced technology adoption. 45.5% strongly agreed, and 18.2% agreed. The respondents were requested to indicate whether the quality of products/services has improved in recent years. 45.5% and 27.3% strongly agreed and agreed, respectively. Subsequently, a question

was asked regarding the potential for customer complaints in recent years; 45.5% agreed and 36.4% strongly agreed.

Open-ended questions were asked about sustainability initiatives taken by the hotels. It was also noted that several projects were implemented along the processes to adopt a greener approach to doing business.

The categories of responses are stated below, including some examples:

- 1) Certifications and commitments; applying/maintaining their certifications; and taking commitments towards sustainability.
- 2) Reviewing activities and processes towards a more sustainable approach; using less paper; food waste reduction programs; waste sorting;
- 3) Working with NGOs; donation of surplus food
- 4) Digitalization; digital timers for external lighting; hotel information booklet on TV
- 5) Protection of biodiversity and eco-systems; organising cleaning days; planting trees;
- 6) Working with local communities; >90% local procurement; supporting and engaging local communities.
- 7) Climate change concerns approaches, lowering carbon footprints, shifting to low carbon footprints, and focusing on the circular economy.
- 8) Education and awareness sessions; beach clean-ups; awareness programs; and regular staff trainings.

The benefits of the above-mentioned initiatives were asked, and the following were revealed: An increase in productivity, which includes the effectiveness of staff,. Moreover, education and awareness are promoted, i.e., raising awareness among employees for them to be more conscious and dedicated to sustainability projects and initiatives. The image and competitiveness of the hotel/resort on the market are enhanced as well. It was also mentioned that they gain reputation and pride from working for such organisations.

The respondents were then requested to mention any difficulties they may face with the implementation of sustainability projects/initiatives. The responses were categorised into two parts, mainly the management of change and culture development and the cost incurred. As per the respondents, the main difficulty is bringing about a change in the mindset of staff. They mentioned as well that the expenses incurred to purchase eco-friendly materials are consequential and the return on investment difficult to define.

It was then asked to mention how the different above-mentioned difficulties are tackled. It was noted that various trainings are organised including programs and plans to raise awareness. Moreover, meetings and quality circles are conducted to discuss on-going projects, and lastly, the commitment of some staff that are passionate about this concept is being used mainly for sharing experiences and passion.

A series of variables were chosen based on their pertinence and their link to the objectives of this project. Spearman's correlation tests were used to determine the correlations as they were more adapted to the context, i.e., Likert scales. It has been noted that the majority presents a strong relationship. The results and their interpretation are mentioned in **Tables 3** and **4** below, respectively.

Table 3. Spearman's correlation results.

Sustainability dimensions involved	Variables tested	Results obtained	Correlation
Environmental Domain	Hotels built on a green building idea, And Measurable targets for the conversion towards more energy-efficient practices.	0.168	No or negligible relationship
Environmental Domain	Waste management system in place, And 3Rs culture promoted/practiced.	0.524	Strong relationship
Social Domain	CSR established, And Occupancy rates grown since implementation of sustainability.	0.662	Strong relationship
Social Domain	CSR established, And Trouble putting sustainable initiatives in place.	-0.315	Moderate Relationship
Economic Domain	Customers willing to pay more for programs that promote sustainability, And Annual turnover grown during last few years.	0.509	Strong relationship
Economic Domain	Customers willing to pay more for programs that promote sustainability, And Reduction in customer complaints in recent years.	0.529	Strong relationship

Table 4. Interpretation table of spearman rank-order correlation coefficients.

Spearman (ρ)	Correlation
≥ 0.70	Very strong relationship
0.40–0.69	strong relationship
0.30–0.39	Moderate relationship
0.20–0.29	Weak relationship
0.01–0.019	No or negligible relationship

Note: This descriptor applies to both positive and negative relationships.

Adapted from de Vries et al. [29].

An average median and mode analysis were conducted based on the responses recorded following Likert scale questions. The following were depicted; the subsections pertaining to more positive than negative responses (≥ 4) were pointed out. For instance, waste handling, disposal, and reduction (average mode 4.1), environmental certifications and accreditation (average mode 4.2), environmental activities and awareness (average mode 5), and social and economic domains pertain to an average mode of 4.1 and 4, respectively. Further, it was observed that the average median and mode values lie more between 3 and 5, meaning that on an overall basis, the responses were more towards the neutral to strongly agree points.

5. Discussion

Scholars in the field of hospitality have acknowledged the significance of sustainability in corporate business policies. Hotels may benefit from sustainability measures to save operating costs, comply with regulations, gain a competitive edge,

increase employee productivity, meet shareholder expectations, and foster customer loyalty, among others [30]. The hotels interviewed are quite dispersed around the island. Most of them are hotels that form part of the main hotel groups in Mauritius. As per Mauritius Hotels [31], several well-known hotel chains from around the world have decided to invest in the island's tourism industry because of societal and economic development as well as changes in tourism. In the global hospitality sector, hotel chains are defined as a horizontal alliance of hotels operating under a single brand [32]. During the data collection process and literature search, it was noted that most of the groups have been launching and nurturing sustainability practices recently. Those initiatives were reflected in the responses given by the interviewees.

Respondents mentioned having different types of certifications related to sustainability. Those were, for instance, Earthcheck (27%), Green Globe (18%), and Travelife Certification (9%). It was noted that some hotels have certifications that were not listed in the multiple-choice question, i.e., Green Key, the pledge on food waste, and the Sustainable Tourism Award. Further, it was recorded that some respondents have more than one active certification as well. Studies suggest that many hotels are being required to implement more ecologically friendly methods due to the rising interest in sustainable development principles and the pressure that is being placed on them from the media, the government, and consumers [33].

The survey depicts that various hotel groups in Mauritius have invested in concrete projects related to sustainability. For instance, substantial investments in solar thermal systems were made. The goal of the hotel group that implemented this project is to replace conventional hot water boilers powered by fossil fuels with ones using solar energy. It was mentioned that they currently have panels covering a total area of about 3700 [25]. More than half of the respondents strongly agreed about currently using renewable sources of energy, and more than 80% of them also strongly agreed about energy efficiency monitoring to save money.

Moreover, there are several hotels that have been certified by "The Pledge on Food Waste." To eliminate food waste, they have worked to develop new operational procedures; among those initiatives are cutting wasteful spending and giving preference to local vendors who share the same values. This pledge shows the hotel's steadfast determination to start down the road of sustainable development [34]. In parallel, there are instances of hotel chains that have also launched an effort to combat food waste by stating that even if food waste is unavoidable, it is still feasible to turn it into energy by creating biogas or by composting or fertilizing the trash [35].

From both a socioeconomic and an environmental perspective, food waste is a big challenge. Waste presents a sustainability concern since it has a significant negative impact on the environment and public health. Inaccurate demand forecasting in hotels frequently leads to overstocking of food and overproduction of meals. Thus, fostering positive relationships with suppliers may make it easier to reduce food waste. This would assist hotel administrators in placing the right amount of food orders when and if necessary [30].

Maintaining environmental sustainability is essential for businesses to achieve growth, draw in new clients, and satisfy customers as they become more aware of and concerned about how their actions are affecting the environment. Going green

benefits hotels financially, lessens their impact on the environment, and wins them favour with customers. It's a win-win situation [36]. It was noted that all the respondents agreed about being dedicated to the reduction of waste within all the processes and the usage of digital tools instead of papers and stationery.

More than 80% of the respondents agreed on calculating/estimating the level of CO₂ emissions in hotels at regular periods (where 45.5% strongly agreed). This result is in line with what [37] pointed out, namely, that with the tourist sector having a substantial influence on global carbon emissions, it is appropriate to measure tourism-related carbon emissions using standard methodologies and to take essential efforts to reduce the emissions as the need for carbon emission reduction has become urgent. In the same vein, the Mauritian hospitality industry started to offer its first carbon-neutral hotel stays [38]. The industry is still figuring out how to lessen the effects of climate change and adapt to climatic shifts by implementing the energy transition idea. Further, a resort group has created several ways to lessen their carbon footprint in accordance with the facts indicated above. It was stated that twelve solar panels that provide renewable energy and warm up the hotel's water have been installed. Additionally, they chose to utilize LED lamps rather than conventional ones to lower greenhouse gas emissions. Translucent roofing over public places was also picked to reduce the consumption of bulbs [39]. Along with that, initiatives to lower carbon emissions year over year have been taken. It has been done by putting into place targeted energy-efficient techniques, including "Carbon Management Strategies" and "Energy Management Systems," among others [40].

With the rapid development of the tourism industry in Mauritius, matters such as overdevelopment of the coastal region, rising pollution, and indifference to natural resources are becoming crucial concerns. Players in the tourist sector are requested to adopt behaviours that are both socially and ecologically responsible if they want to succeed [41]. Following a series of questions asked on the various activities related to the environment organised at the hotels, it has been observed that the responses are quite on the positive side.

90% of the respondents agreed that water consumption has decreased over the years. Moreover, it can be specified that a water recycling system was implemented (72.7% strongly agreed). To save water, hotel groups in Mauritius have launched several initiatives. For instance, some of them are dedicated to ensuring that their business does not jeopardize basic services, including water [23]. Further, ingenuities to minimize water use, the implementation of water management systems, and the recycling of water for irrigation purposes have been implemented throughout the island by different hotel groups [24,26]. Rodrigues Island has initiated practical efforts by relying on seawater desalination to provide its residents with clean drinking water. Each day, this service may deliver 1000 m³ of drinking water [42]. Some hotels have also adopted the use of seawater desalination. For example, as part of their sustainability commitment, a hotel group mentioned that some of their hotels have implemented this technique [43].

Nearly 91% of the interviewees strongly agreed about the hotels working closely with NGOs and local communities. Considering the concepts of equality, the significance of community, and its potential, NGOs play an important role in ensuring that benefits reach communities [44]. Various hotel groups in Mauritius

took initiatives towards the economic aspect of sustainability. One of them states that the local economy can be strengthened through tourism. Considering the seriousness of environmental challenges, it may also assist Mauritius in innovating, exploring new areas, and proposing new services that benefit everyone. It was noted that their economic strategy is focused on inclusion and that they think everyone should gain from tourism. This hotel group specified their eagerness to help local business owners and has committed to collaborate with them on this matter [24]. In the same vein, a hotel group developed the idea of “Responsible Hospitality”. Within the framework of the circular economy, the latter seeks to balance environmentally responsible economic growth. This means that hospitality encourages a connection with nature, as well as accommodations that are more ecologically friendly and ethical behaviour [26].

Studies suggest that adopting sustainable practices improves a business’s performance at many different levels, including employee happiness, brand reputation, image improvement, and stakeholder loyalty, which in turn gives the corporation long-term competitive benefits. The advantages of sustainability for businesses can come in the form of real advantages like lower operating costs and risks as well as intangible advantages like improved brand recognition, talent attraction, and competitiveness [45].

Following spearman’s correlation tests conducted, it was revealed that a proper CSR established and the growth of occupancy rates since implementation of sustainability share a strong positive correlation ($p = 0.662$). With regards to the debate on the willingness of customers to pay more for programs that promote sustainability, it was found that this variable is strongly related to the growth of annual turnover during the last few years ($p = 0.529$). Therefore, based on those two results, it can be said that indeed, customers are becoming more conscious of the urgent need to take action with regards to sustainability. Those data show how sustainability has helped in the economic aspect of the hotel industry. By having more satisfied customers, an increase in profitability is most likely possible, thus ensuring ROI in the long run.

Implications

The aim of this study was to assess the various practices adopted by the hotels in Mauritius with regards to sustainability. A focus was placed on the three domains of sustainability. This aids in getting a better understanding of the actions being taken by the hotel industry in Mauritius with respect to sustainability. Various research has been conducted on sustainability as a general concept and in various business sectors worldwide. However, placing the focus on the 3- to 5-star hotels in Mauritius was an interesting topic, especially following the COVID-19 pandemic that has drastically impacted this sector. Since the impact of climate change is already affecting Mauritius, there is indeed a need to assess where this sector stands regarding the urgency of developing a more sustainable way of doing business and what difficulties they are facing with this change.

It was noted through a literature search that tourists’ mindsets are changing and the demand for ‘greener’ hotels is increasing. To remain competitive on the market,

it is a must for hotels to change their way of operating for a more sustainable one. It was, however, noted that major hotels have recognized this need for change and have already started to take concrete action. As one of the top pillars of our economy in Mauritius, the hotel industry plays a major role in contributing to a more sustainable country. The latter is facing a great challenge nowadays to coincide with the preservation of our biodiversity and economic development and growth. This sector has greatly evolved through the years, and the number of hotels has considerably increased.

As its definition suggests, sustainability is required to be able to meet the needs of the present without compromising the needs of future generations. The concept consists of finding a balance between the preservation of our environment, ensuring our economic growth, and community involvement. As part of the survey, initiatives taken by the hotels as well as the difficulties being faced by them were assessed and discussed. Based on the analysis made, concrete recommendations to overcome the obstacles stipulated and help in a better transition can be presented. Studies revealed that including some quality management features within the sustainability framework could help the hotels overcome various operational issues that can serve as barriers to reaching sustainability objectives. This research work focused on the history and benefits of QM, mainly for the hotel industry.

6. Conclusion and recommendations

Growing demand for ‘green hotels’ has encouraged the hospitality industry in Mauritius to take concrete actions towards sustainability. The results revealed that quite diverse initiatives have been taken, irrespective of the domains. This study uncovered that people from all parts of the globe are becoming more knowledgeable and conscious of the urgency to act for a sustainable future. Consequently, as a baseline, most of the hotels interviewed have gone through sustainability-related certifications, which have helped them implement or develop new activities and processes. In parallel, the certification helped in the marketing aspect of the business to distinguish themselves from competitors, attract tourists, and boost their image. The survey allowed us to identify the various barriers to sustainability being faced by this powerful sector as well as suggestions from the respondents to overcome them. It was, however, noted that none of the interviewees possessed an Environmental Management System (ISO 14001) certification, which focuses on the PDCA cycle to achieve continual improvement.

It was pointed out throughout this research work that the goal of a QMS closely joins the sustainability one in the sense that the aim is to achieve or exceed customer satisfaction by increasing efficiency and productivity and, in parallel, reducing costs by mitigating defects/wastes. Therefore, based on the data collected, the framework below (**Figure 6**) has been developed, which depicts how quality can be incorporated along with sustainability in an hotel operation chain to achieve customer satisfaction.

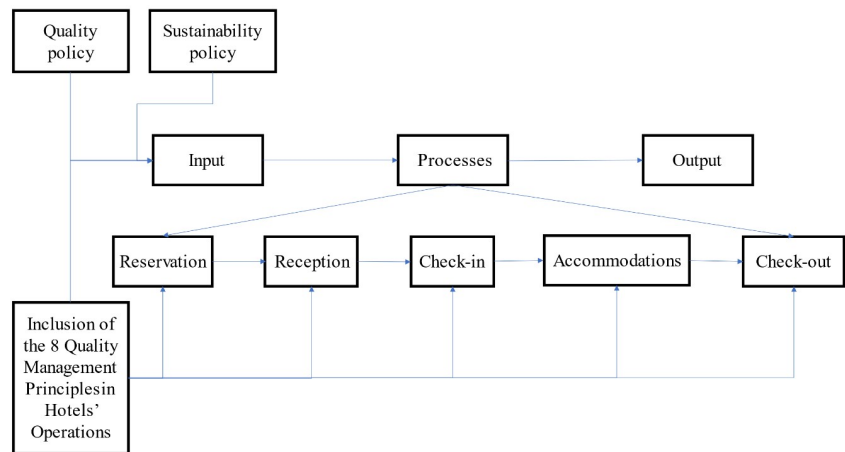


Figure 6. Framework linking quality to sustainability.

It is proposed that a quality and a sustainability policy be designed and used as benchmarks. A policy is defined as a guideline for action. Through the latter, the top management will be able to communicate their commitment and align their sustainability and quality mission, strategic direction, and purpose. The policy will help in cascading clear communication, which will contribute to enhancing employees’ understanding, morale, and engagement, thus boosting their productivity.

The hotel does not necessarily need to go for certification to incorporate quality into sustainability. Studies suggest that QM is dynamic and multi-interpretable. Thus, the purpose of this framework is to target strategic aspects of TQM that can be used to optimize efficiency and overcome various specific barriers. The Quality Management Principles (QMPs), shown in **Figure 7**, are proposed to be used as a foundation to implement features of Quality Management (QM).

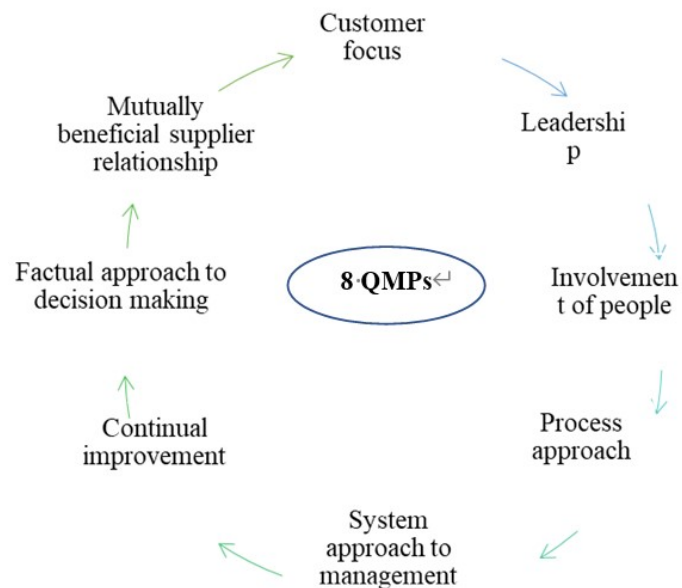


Figure 7. Quality Management Principles (QMPs).

The QMPs can be understood and adopted at each level to ensure that all actors are included in the chain. This process is important to align communication with respect to the customer’s demands. The purpose is that all actors in the chain work

toward a common goal, which will alleviate delays in operations and thus improve customer satisfaction. **Table 5** shows the suggested approaches to the QMPs concept. The approaches were designed based on data collected from the survey and knowledge gathered through the secondary data collected. The goal is to support the hotels in continuously improving numerous key factors in a holistic manner.

Table 5. QMPs and the suggested approaches.

QMP	Suggested approach
1	Customer focus
	Rising environmental concerns and awareness within customers have triggered more sustainability efforts from hotel industry. Customer focus is about understanding the needs and expectations of the clients to ensure their satisfaction. It is suggested that top management aligns their objectives in this sense. Managing customer relationships through effective communication, feedback mechanisms and measurement of the results can help in enhancing the productivity of the different processes. The purpose is to develop strong customer loyalty thus increasing revenue.
2	Leadership
	Leadership has a significant impact in the development of sustainability within a hotel operation. Leaders are needed to identify clear goals and objectives. This will ensure employees' involvement to meet the targets set. Making sure that employees understand the organisation's vision and mission can contribute to boost collaboration and teamwork thus overall efficiency.
3	Involvement of people
	Through the survey, some respondents expressed their pride of working in an organisation that is engaged in SD. Employee engagement is about creating loyalty and trust within the workforce. The latter can contribute to an enhancement in the reputation and image of the hotel. TQM approach in parallel suggested that involvement of people comprises that each employee is responsible to assess the quality of the products or services at their respective levels. This will promote empowerment within the workforce thus serving as a tool to attract, recruit, and retain employees. The recommended approach is a combination of sustainability and involvement of employees to create a positive culture.
4	Process approach
	A process is defined as a set of interrelated activities that transform inputs into outputs. The process approach is about identifying the different processes in the chain as well as their interrelationships to promote transparency. Process maps can be used to do so. Moreover, the hotel can evaluate the risks associated to each process that can impact on the stakeholders. To ensure effectiveness, each process will need to be monitored, analysed, and measured through KPIs for instance so that actions are taken accordingly to create continual improvement. In QM, this approach is generally referred as Plan-Do-Check-Act (PDCA) cycle and risk-based thinking approach.
5	System approach to management
	This principle is about understanding and managing a system of interrelated processes (or a 'whole' which comprises of interdependent parts named subsystems) for any opportunity to improve the hotel's efficiency. The importance of this QMP is linked to the continuous improvement process. An hotel operation is dynamic, this approach is focused on paying attention to the effectiveness of the system as a whole instead of focusing on the subsystems.
6	Continual improvement
	Incorporating continual improvement in sustainability is about having a long-term vision for the hotel. The vision can be cascaded down from top management to middle management who will express their commitment to lower-level employees. Developing a strong leadership and aligning the hotel's strategy will promote ongoing improvement of the products/services quality. Through continual improvement approach, teamwork and empowerment of employees will be promoted leading to a reduction of defects and variation in the system.
7	Factual approach to decision making
	The ability to make appropriate decisions in SD plays an important role in employee management and customer satisfaction. To ensure that decisions are the most effective ones, it is vital that decision-makers based themselves on analysis of data rather than intuition in some strategic cases. Factual approach can be applied for instance in case of corrective actions that are required after a non-conformity is raised or as a preventive action to avoid a non-conformity. Data collected for decision making process should be correct, reliable, and accessible to all interested parties within the hotel operations. Statistical tools, for instance, the 7 quality tools originally developed by Kaoru Ishikawa can be used to collect or measure data.
8	Mutually beneficial supplier relationship
	This QMP is about building a long and healthy relationship with the suppliers. In QM, an organisation and its suppliers are viewed as interdependent. A mutually beneficial relationship will enhance value creation thus allowing for the improvement of the overall chain. Feedback mechanisms between the hotel and its suppliers can be initiated to promote proper flow of communication, alleviate delays in operations and enhance customer service.

7. Future work

The recommendations made can contribute to overcoming the various barriers that have been mentioned by the respondents, namely, the ROI following the cost incurred for sustainable development and the change management difficulties. The approach used was based on the incorporation of QM features in SD. It is believed that the application of the framework can contribute to the improvement of customer service, reduction of defects and waste within the operations, enhancement of employee satisfaction, thus improvement of productivity and an overall upgrade in hotel reputation and image, among others.

As a future project, it will be interesting to test and follow up on the practical feasibility of the framework proposed in this research work. Further, since it was raised that QM features can serve as a potential solution to overcome the sustainability barriers faced by the hotel industry, a case study will complement this project.

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