## Journal of Social Sciences Research & Policy (JSSRP)

**GISSR**
Global Institute of
Social Sciences Research

### Adopting Circular Economy Principles in Hospitality: A Case Study of Peshawar, Pakistan

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**Abstract:** *Tourism and hospitality are significant economic drivers but also contributors to environmental degradation. The circular economy (CE) offers a sustainable alternative to the sector's prevailing linear "take-make-dispose" model by promoting resource efficiency and waste reduction. This study explores the adoption of CE principles in the hospitality industry of Peshawar, Pakistan, an emerging tourism market. We conducted qualitative interviews with managers of ten hotels and guesthouses to understand their awareness of CE, the initiatives they have implemented, and the benefits and challenges of CE adoption. The findings reveal that while participants recognize sustainability's importance and have implemented select CE practices (particularly the "3Rs" of reduce, reuse, recycle), their understanding of CE is largely limited to these basic principles. Key initiatives identified include energy conservation (solar panel use), refurbishing with reclaimed materials, remanufacturing furniture, and repurposing waste items. Respondents reported benefits such as cost savings and reduced pollution, but also noted obstacles including limited knowledge, financial constraints, and lack of institutional support for implementing broader CE strategies. This paper discusses the implications of these findings in the context of extant literature and offers recommendations to strengthen circular practices in hospitality. It contributes to the nascent research on CE in tourism by providing insights from a developing country context. The study highlights the potential for circular practices to enhance sustainability in hospitality, while underscoring the need for greater awareness, supportive policies, and innovation to overcome current challenges.*

## Introduction

The tourism and hospitality sector is a pivotal part of the global economy, contributing about 7.6% of worldwide GDP and providing roughly one in ten jobs. This rapid growth, however, comes with significant environmental challenges – tourism activities account for an estimated 8% of global greenhouse gas emissions. Hotels, restaurants, and related services consume large quantities of energy and water and generate substantial waste, putting pressure on local ecosystems and infrastructure.

These impacts have spurred interest in sustainable tourism practices to mitigate environmental harm while maintaining economic and social benefits.

In recent years, the circular economy (CE) has emerged as a promising framework for enhancing sustainability across industries. CE is commonly defined as a regenerative economic model that minimizes resource input and waste output by keeping materials and products in circulation for as long as possible. For example, Geissdoerfer et al. (2017) describe CE as a system aimed at "slowing, closing, and narrowing material and energy loops" to reduce virgin resource use and eliminate waste. In contrast to the traditional linear "extract-produce-use-dump" model, a circular approach designs out waste and continually recycles, reuses, or remanufactures materials, thereby preserving natural resources and reducing pollution. To achieve these goals, businesses can employ a variety of strategies often summarized under the "9R" framework – refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, and recover (Kirchherr et al., 2017). Prior research suggests that transitioning to a circular model can yield both environmental and economic benefits, helping solve sustainability problems while even improving profitability in the long run.

Governments and industry leaders worldwide have started to embrace CE principles. The European Union, for instance, has adopted an ambitious Circular Economy Action Plan (2020) to promote recycling, waste reduction, and eco-design across industries. China formally incorporated CE into its national development strategy in the early 2000s, implementing pilot projects to close resource loops. In the hospitality sector specifically, a circular approach could involve measures such as minimizing food waste, using renewable energy, water recycling, and designing hotel operations to reuse materials. Such practices not only help conserve resources and cut emissions, but can also reduce operating costs and appeal to environmentally conscious consumers.

Despite its potential, the application of circular economy in tourism and hospitality remains an emerging field. The academic literature on CE has been dominated by studies in manufacturing and engineering contexts, with far less attention to service sectors like tourism. Tourism has until recently "not yet received much attention as a possible context for CE initiatives", though scholars note that this is likely to change as sustainability moves up the agenda (Rodríguez *et al.*, 2020). Indeed, the tourism industry's intensive use of resources and generation of waste make it a logical candidate for circular strategies. A few studies have started to explore this intersection:

for example, da Silva *et al.* (2021) found a growing academic interest in CE in tourism and hospitality, but also highlighted a lack of clear guidelines for implementing CE in this sector. Similarly, Rodríguez-Antón and Alonso-Almeida (2019) examined European hotel chains and observed that the industry is only gradually incorporating CE practices, mainly focusing on key issues of energy, water, and waste management using approaches aligned with the classic "reduce, reuse, recycle" framework. In other words, hospitality businesses tend to implement partial circular strategies (primarily the 3Rs) and evolve earlier sustainability efforts into more innovative ones in these domains. Case studies in developed regions show initiatives like installing energy-efficient systems, minimizing single-use plastics, recycling programs, and innovative waste-to-resource solutions being adopted by leading companies. For instance, the InterContinental Hotels Group's *Green Engage* program and Accor's *Planet 21* plan have introduced measures to reduce energy and water use, increase renewable energy uptake, and eliminate certain waste streams (e.g., plastic straws) in their hotels. These examples illustrate the hospitality sector's move toward circularity, but such efforts are largely concentrated in advanced economies and large corporate chains.

## Research gap

There is a dearth of research on how CE principles are understood and applied in tourism and hospitality in developing country contexts. Much of the existing literature and documented best practices come from Europe or other developed regions. This leaves a significant knowledge gap regarding the drivers, barriers, and extent of CE adoption in emerging economies. Pakistan, in particular, has seen limited scholarly attention in this domain. As a developing nation with a growing emphasis on sustainability, Pakistan stands to benefit from circular practices, yet its tourism and hospitality industry has only recently begun to explore such concepts. Within Pakistan, the city of Peshawar offers an interesting case: it is a historic gateway city with a modest but developing tourism sector, and local hospitality businesses are increasingly aware of global sustainability trends. However, like many cities in the region, Peshawar faces challenges such as inadequate waste management infrastructure and limited environmental regulatory enforcement, which could impede the shift toward circular operations.

## Study aim

This study aims to evaluate the understanding and implementation of circular economy principles in Peshawar's hospitality industry. We seek to identify which CE strategies (if any) local hotels and guesthouses are practicing, what benefits they perceive from these practices, and what challenges they encounter in trying to "close the loop" in their operations. By focusing on a developing country setting, the research provides insights into how global sustainability frameworks like CE translate to a local context with its own economic and infrastructural constraints. Ultimately, the goal is to contribute to the literature on sustainable tourism management by showcasing a case study from Pakistan and offering recommendations to accelerate the adoption of circular economy practices in similar contexts.

## Structure of the paper

The following section reviews relevant literature on circular economy concepts and their application in the tourism and hospitality sector. Next, the research methodology is described, followed by the results of interviews with hospitality establishments in Peshawar. The discussion section then interprets these findings in light of existing research, and the paper concludes with recommendations and implications for industry and policy.

## Literature Review

### Circular economy concept

The circular economy has gained attention as a holistic approach to sustainable development, contrasting sharply with the linear economic model that dominates most industries. In a linear model, resources are extracted, turned into products, used, and ultimately disposed of as waste – a pathway often summarized as "take, make, dispose." This model leads to inefficiencies and externalities including resource depletion, pollution, and economic losses from wasted materials. CE, by contrast, endeavors to design production and consumption systems that are regenerative by intention. It builds on earlier concepts of recycling and sustainability but extends beyond them to fundamentally rethink how value is extracted from resources over time. Geissdoerfer *et al.* (2017) define the circular economy as an economic system "in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops". "Slowing" loops means extending product lifespans (through design for durability, reuse, repair, etc.), "closing" loops refers to recycling materials back into production, and "narrowing" loops means using fewer resources and generating less waste per product. The CE thus aims to maintain products, components, and materials at their highest utility and value at all times.

To operationalize the CE, various frameworks have been proposed. One widely cited framework is the 9R (or 10R) framework that outlines strategies ranging from smarter product design to end-of-life

recovery. Kirchherr *et al.* (2017) articulate these strategies as: Refuse (avoid unnecessary products), Rethink (intensify product use, e.g. via sharing or servicizing), Reduce
(minimize resource use and waste generation), Reuse (use products again for the same purpose),
Repair (fix broken products to extend life), Refurbish (restore an old product and update it), Remanufacture (create a product from used components), Repurpose (use a product or its parts for a new purpose), Recycle (process materials to obtain raw materials), and Recover (retrieve energy or materials from waste that cannot be recycled). Not every strategy is applicable to every industry, but together they provide a toolkit for moving toward circularity. For instance, refusal and rethinking might involve hotels eliminating single-use amenities or shifting to service models that encourage less consumption. Reduction could involve using resource-efficient technologies (such as LED lighting to cut energy use or low-flow fixtures to reduce water consumption). Reuse, repair, and refurbish encourage keeping assets in service longer – e.g. reusing linens, repairing furniture instead of discarding it, or refurbishing old décor with recycled materials. Remanufacturing could apply to certain equipment or fixtures (like re-upholstering furniture or rebuilding appliances). Repurposing might involve finding new uses for waste products, such as turning used glass bottles into decorations. Recycling is the process most familiar to businesses, involving sorting and sending waste materials (paper, plastic, glass, food waste, etc.) to be recycled into new materials. Recovery could mean composting organic waste to recover nutrients or installing systems to capture energy from waste (though in hospitality this is less common without specialized facilities).

## CE in tourism and hospitality

While the core principles of CE were developed with product manufacturing in mind, they are increasingly being applied to service sectors. The tourism industry, comprising travel, hospitality (lodging and food services), and attractions, is resource intensive and thus a ripe field for circular innovation. However, academic research on *circular tourism* or *circular hospitality* is still in its infancy. Rodríguez *et al.* (2020) conducted a critical literature review of CE contributions to tourism and found that very few publications explicitly address CE in tourism, underscoring that the concept had yet to gain traction in this domain as of 2020. They note that tourism's resource flows often intersect with other sectors (e.g., energy, agriculture, and waste management), complicating the direct application of manufacturing-oriented CE models but also making it crucial to pursue circularity given tourism's broad environmental footprint. The scarcity of literature does not imply lack of interest; on the contrary, scholars like Vargas-Sánchez (2018) have argued that tourism will "deserve much more attention at the international level in years to come" in CE research. Supporting this, da Silva *et al.* (2021) found an uptick in publications on CE in tourism in recent years, though these remain limited and often conceptual. Their analysis of scientific production on CE in tourism and hospitality shows that interest is emerging, with topics ranging from waste management in hotels to sustainable tourism policies, but empirical studies are still relatively few.

One reason for the limited research could be that hospitality firms have only recently begun to adopt circular practices, often under the broader umbrella of sustainability. Many hotel companies have long had environmental initiatives (energy conservation, towel reuse programs, recycling bins, etc.), but framing these within a comprehensive CE strategy is new. RodríguezAntón and Alonso-Almeida (2019) provide evidence that large hotel chains in Europe are starting to integrate circular economy thinking into their operations. In their multicase study of four international hotel groups, they observed initiatives concentrated in three key areas: energy, water, and waste. Examples include transitioning to renewable energy sources (solar panels, purchasing green energy), installing water-saving and

greywater recycling systems, and implementing aggressive waste reduction and recycling programs (such as food waste tracking systems and elimination of single-use plastics). They note that the most common strategies correspond to the 3Rs – reduce, reuse, recycle, which are the easiest to implement and often provide quick wins in cost savings and public image. More advanced or less common strategies

(like industrial symbiosis, product-service systems in hospitality, or full "refuse" of certain products) were not widely observed, indicating that the hospitality industry is evolving its sustainability practices incrementally toward circularity.

Other studies echo these findings. Bittner *et al.* (2024) compared hotels in a developed economy (the Netherlands) with those in an emerging economy (Indonesia) regarding CE adoption. They found that in both contexts, businesses prioritized initiatives that had clear operational benefits, such as reducing food waste, improving energy efficiency, and reusing materials, while more radical changes to business models were rare. Notably, their study highlights that the barriers to CE implementation can differ by context: Dutch hotels cited challenges like an overload of potential circular solutions and lack of knowledge on which to choose, whereas Indonesian hotels struggled with basic issues like weak waste management infrastructure and limited regulatory support. This suggests that while the concept of circular economy is universally relevant, the path to implementation in hospitality may look very different in a developing country setting. Similarly, Sorin and Sivarajah (2021), in examining Scandinavian hotel operators, reported that even sustainability-leading regions face obstacles in moving beyond incremental changes – organizational culture and customer expectations can slow the adoption of more circular practices, and hotels often focus on measures that align with cost reduction or existing customer comfort levels rather than radical innovations.

In summary, the literature indicates that circular economy applications in tourism/hospitality are emerging but nascent. There is broad recognition that tourism's environmental impacts (GHG emissions, waste, and water usage) need addressing, and CE offers a framework to do so. Initial steps in the hospitality industry have mainly involved resource efficiency (reducing energy and water use) and waste management (recycling and reusing materials), effectively tackling low-hanging fruit that provide economic savings and sustainability branding. However, more comprehensive circular strategies (e.g., designing hotels for modularity and disassembly, sharing platforms for hotel resources, or circular supply chain partnerships) are still rare. The context of developing countries adds additional challenges like lack of infrastructure, limited awareness, and fewer financial resources to invest in new technologies. This study builds on the above insights by exploring how these themes play out in the context of Peshawar, Pakistan. By doing so, it responds to calls in the literature for more diverse case studies on CE in tourism beyond the often-studied regions, thereby contributing to a more globally inclusive understanding of opportunities and barriers for circular economy in hospitality.

## Methodology

### Research Design

To investigate the application of circular economy principles in Peshawar's tourism and hospitality sector, we adopted a qualitative, exploratory research design. A multiple case study approach was used, focusing on ten hospitality and accommodation establishments in Peshawar. Given the limited prior research on CE in this context, an exploratory design allowed us to gather in-depth insights into how local businesses understand and implement circularity in practice. Qualitative methods were deemed suitable because the study aims to capture not just *what* actions are being taken (or not taken), but also *why* – including managerial perceptions, motivations, and challenges.

The primary data collection method was semi-structured interviews with key informants at each establishment. We identified hotels and guesthouses known for incorporating sustainability or eco-friendly practices in their operations, using purposive sampling. The rationale was that these information-rich cases would likely have some experience or awareness of circular concepts (even if not by that name) and could speak to the benefits and difficulties encountered. The selected sample included a mix of small guesthouses and larger hotels, some independent and some part of local chains, to provide variation in size and organizational structure. All are involved in core hospitality services (lodging) and many also offer related services such as dining, event hosting, or tourism activities, thus providing a broad view of the sector (see Table 1 for profile of the establishments).

**Table 1.** Profile of participating hospitality establishments (Peshawar, Pakistan)

| Code | Main Activities of Establishment | Years in Operation | Approx. Weekly Customers/Occupancy |
|---|---|---|---|
| A1 | Accommodation, events, restaurant | 9 | 1500–2000 guests |
| A2 | Accommodation, catering, tourism activities | 28 | ~50% occupancy |
| A3 | Accommodation, catering, events, airline services | 24 | ~50–60% occupancy |
| A4 | Accommodation, catering, tourism activities | 29 | ~32 guests |
| A5 | Accommodation only | 24 | ~40 guests |
| A6 | Accommodation, catering, events | 0.9 (11 months) | ~1867 guests |
| A7 | Accommodation, event venue | 1 | ~40 guests |
| A8 | Accommodation and catering | 7 | ~50 guests |
| A9 | Accommodation only | 45 | ~1400 guests |
| A10 | Accommodation only | 16 | ~280 guests |

As shown in Table 1, the participating establishments vary widely in size and experience from a newly established boutique hotel (A6, <1 year old) to a long-running inn with 45 years in business (A9). Weekly customer volumes range from a few dozen to nearly two thousand, indicating some properties serve as small guesthouses while others are among Peshawar's busier hotels. This diversity in operational scale and services provided a rich backdrop to examine the applicability of circular economy approaches across different contexts within the local industry.

**Data Collection**

We conducted ten face-to-face interviews (one per establishment) over July–August 2024. Each interviewee was either an owner, general manager, or senior operations manager with comprehensive knowledge of the hotel's sustainability efforts and operational practices. Targeting these decision-makers was important, as they are typically the ones to initiate or approve environmental initiatives and thus could speak in detail about any circular economy concepts being applied.

An interview guide was developed to ensure consistency, comprising five groups of questions aligned with our research objectives:

1. **Concept Awareness:** Understanding of sustainability and the circular economy – e.g., *"How important is environmental sustainability in your business? What does the term 'circular economy' mean to you, if you are familiar with it?"*

2. **Current Initiatives:** Specific actions taken to reduce waste, reuse or recycle materials, or generally improve resource efficiency – e.g., *"Can you describe any initiatives your hotel has implemented that align with reducing waste or reusing resources?"*

3. **Benefits Perceived:** The positive outcomes (if any) from implementing these practices – *"What benefits have you observed from these eco-friendly or circular practices (such as cost savings, customer response, etc.)?"*

4. **Challenges Faced:** Difficulties in implementing or maintaining circular/sustainable initiatives – *"What challenges or barriers have you encountered in trying to implement these practices?"*

5. **Future Plans:** Attitudes toward expanding circular economy practices – *"Are there additional measures you are considering for the future to become more circular or sustainable? What support would you need to do so?"*

Interviews were conducted predominantly in English (with occasional clarification in the local language when needed) and lasted between 45 minutes to 1.5 hours. All participants gave consent for the interview and note-taking; in a few cases, permission was also obtained to record the conversation for accuracy. The semi-structured format allowed us to probe for depth – for example, if an interviewee mentioned a recycling program, we followed up about how it operates, its effectiveness, and any issues encountered. Conversely, if an interviewee was not familiar with the term "circular economy," the interviewer provided a simple definition and examples (e.g., reducing, reusing, recycling practices) and then asked how the business might relate to those ideas. This ensured we could still gather relevant information even if the specific terminology was new to the respondent.

## Data Analysis

The qualitative data (interview transcripts and notes) were analyzed using a thematic analysis approach. We began by transcribing recordings and translating any non-English responses to English. Each transcript was read multiple times and coded for key themes corresponding to our main inquiry areas: *importance of sustainability*, *understanding of CE*, *circular initiatives*, *benefits*, and *challenges*. Within these broad categories, more specific sub-themes were identified inductively from the data. For instance, under initiatives, distinct categories emerged such as *energy conservation*, *water management*, *waste reduction*, *reuse and recycling*, etc., which were used to group specific examples provided by the interviewees? Similarly, under challenges, subthemes like *lack of awareness/training*, *cost constraints*, and *policy/infrastructure gaps* were identified based on frequent mentions.

To enhance reliability, two researchers independently coded a subset of the interviews and compared their coding; differences were discussed and the coding framework was refined accordingly. This iterative process helped ensure that the themes were grounded in the data rather than purely assumed from literature. We then synthesized findings across cases, noting patterns or divergence. Simple quantitative tabulations were also done (e.g., counting how many establishments implemented a certain type of initiative, or how many mentioned a particular benefit or barrier) to provide a sense of prevalence, which we present alongside qualitative descriptions. These counts are used cautiously, given the small sample, but they add context (for example, indicating whether an observed practice is common or just an isolated case among those interviewed).

We present the results in the next section, organized thematically with illustrative quotes from participants (using the codes A1–A10 to anonymize their identity). Tables are used to summarize key

quantitative aspects of the findings, such as the profile of cases (Table 1) and the extent of CE principle adoption at each establishment (Table 2).

## Results

### Awareness of Sustainability and Circular Economy

All interviewees unanimously affirmed that environmental sustainability is an important consideration for their business. When asked about the significance of sustainability, respondents often linked it to both ecological responsibility and operational benefits. For example, multiple managers noted that adopting eco-friendly practices *"decreases pollution"* (Participants A1, A4, A9) and is simply necessary given the negative environmental impacts of conventional operations. As one hotel owner explained, *"We understand the negative effects of pollution and that it is the main cause of environmental problems and has an effect on our business"* (A4). Others highlighted efficiency and cost motivations, with one respondent stating, *"We are sure that careful use of resources leads to enhanced management and more efficient service"* (A1), implying that sustainability measures can improve the quality and profitability of their operations.

When introduced to the term "circular economy," most participants were not initially familiar with the specific phrase. However, after a brief explanation, the majority were able to describe the concept in their own words, often emphasizing particular aspects of circularity. Notably, eight out of the ten interviewees associated the circular economy primarily with the reuse, repair, and remanufacture of products. These three R's were repeatedly mentioned as the essence of what a circular approach means to them – for instance, respondents variously described CE as *"using things again instead of throwing away, fixing what can be fixed, and making new things from old parts"*. This indicates a solid grasp of the idea that extending the life of goods is central to circularity. Furthermore, about half of the participants also explicitly mentioned "reduce and recycle" as key tenets. For example, one manager (A2) summed up CE as *"the reuse, repair, remanufacture of products, and of course also reduce and recycle waste"*. These responses suggest that, even if the term "circular economy" itself was not widely known, the underlying principles – especially the classic 3Rs – are well understood and valued among these hospitality businesses.

However, it was also evident that more advanced or abstract CE principles (like refuse, rethink, or recover) were not part of the participants' working definition. None of the interviewees brought up the idea of refusing unnecessary consumption or fundamentally redesigning services for circularity, nor did anyone mention recovery of energy or materials from waste. This is perhaps not surprising – concepts such as refusing or rethinking business models can be less intuitive and more challenging to implement in a hospitality context. The focus of understanding remained on tangible actions like recycling materials, reusing items, and keeping equipment in use longer (repair/remanufacture). In summary, the hospitality managers in Peshawar recognize the importance of sustainability and can articulate core circular practices (mostly aligned with the 3R framework). Yet, their conceptualization of a circular economy is somewhat narrow, centered on waste reduction and product life-extension, with little reference to systemic changes or the full spectrum of CE strategies as defined in literature. This provides useful context for interpreting the specific initiatives they have (or have not) implemented, as discussed next.

### Implementation of Circular Economy Principles

Despite the varying sizes and types of the establishments, all except two of the businesses had taken *at least some* initiatives consistent with circular economy principles. We identified and categorized the initiatives mentioned by interviewees into a few major groups. These are summarized in Table 2, which

maps each case (A1–A10) against the CE principles they have put into practice.

**Table 2.** Adoption of circular economy (9R) principles by hospitality establishments

*(*Each establishment is coded A1–A10; principles implemented are marked, reflecting interview and observational data*.)*

| Code | CE Principles Implemented | Count of Principles Applied (out of 10) |
|---|---|---|
| A1 | Reduce (energy use), Recycle (waste materials), Repurpose (items) | 3 |
| A2 | Reuse (materials), Refurbish (rooms/facilities) | 2 |
| A3 | Reuse (materials), Refurbish (rooms/facilities) | 2 |
| A4 | Reduce (resources), Reuse, Recycle, Repair, Remanufacture | 5 |
| A5 | Reduce (resources), Reuse, Recycle | 3 |
| A6 | *(none reported)* | 0 |
| A7 | *(none reported)* | 0 |
| A8 | Reuse (materials), Recycle | 2 |
| A9 | Reuse (materials), Refurbish, Remanufacture | 3 |
| A10 | Reuse (materials), Recycle | 2 |

From Table 2, we see that the extent of CE principle adoption varied, with the number of implemented principles ranging from zero in two cases (A6 and A7) up to five in one case (A4). A4 stands out as the most proactive in circular practices, having embraced multiple strategies spanning reduction of resource use, reusing and recycling materials, repairing equipment, and even remanufacturing items (details provided below). On the other end, two smaller or newer establishments (A6, A7) had no notable circular practices in place – their managers admitted that they had yet to implement formal sustainability measures, being preoccupied with basic business operations in their early stages.

Looking at which specific principles were common: Reuse and recycling are the most widely practiced, appearing in a majority of cases. Many interviewees described efforts to recycle waste (such as sorting paper, plastic, glass, or partnering with local recyclers) and to reuse materials or products internally. For instance, several hotels mentioned reusing linens and towels internally (beyond the standard "towel reuse" card for guests, some would repurpose slightly worn linens for staff use or other purposes rather than disposing). A8 and A10, which otherwise had modest programs, both ensured recycling of common materials and some reuse of items like glass bottles or containers in-house.

Reduction of resource consumption was cited in a few cases (A1, A4, A5) particularly regarding energy and water. A1 and A4, for example, invested in energy-efficient appliances and lighting to cut electricity use (which aligns with "reduce"), and they train staff to minimize wasteful practices (like not running HVAC in unoccupied rooms). A1's management explicitly framed this as both cost-saving and environmentally driven – using less electricity from the grid (especially by generating solar power on-site) reduces their carbon footprint and utility bills simultaneously.

Refurbish and remanufacture – which involve restoring or rebuilding existing assets – were implemented by a subset of the hotels. Three establishments (A2, A3, A9) undertook renovations using secondary/recycled materials, which falls under refurbishing. For example, participant A3 shared that

during a recent room renovation, *"We renovated and decorated our rooms with secondary materials"*, meaning they purchased reclaimed wood for furniture and reused decor elements from other sites, rather than buying everything new. This not only saved costs but was a point of pride for their eco-friendly positioning. Remanufacturing was less common but notably present in two cases: A4 and A9 both have a practice of remanufacturing or up cycling furniture. Participant A4 explained that they work with a local workshop to "re-manufacture [our] furniture" – rather than discarding old chairs and tables, the furniture is disassembled, broken parts are replaced, and it is rebuilt (sometimes with a new design or upholstery). A9 similarly mentioned sending some old wooden furniture to be stripped and rebuilt, extending its life by essentially making a "new" piece from the old components.

Another creative practice was repurposing waste items for new uses, exemplified by A1. In A1, the management found an inventive solution for water storage by reusing large industrial oil containers. *"We use our used oil containers for water saving,"* said the manager of A1, describing how they cleaned out big metal drums (previously used for cooking oil) and integrated them into their rainwater harvesting system to store water. This is a clear case of repurposing an item that would otherwise be waste, turning it into a useful asset for water conservation. None of the other participants reported a similar practice, making this a unique example in our sample of the "repurpose" principle.

On the other hand, several CE principles were not observed at all in our cases. No establishment had any practice corresponding to "refuse" – such as refusing certain non-circular products or avoiding single-use items entirely – beyond standard measures like not using plastic straws (which a couple of hotels mentioned as part of general green policies). Similarly, "rethink" (fundamentally changing the business model or service design) was not explicitly mentioned; none of these hotels have adopted innovative models like product-service systems or sharing platforms (e.g., lending services for equipment) that some advanced CE implementations entail. "Recover" (energy or material recovery) was also absent – none of the hotels have biogas digesters, waste-to-energy systems, or similar technologies in place. This is unsurprising given the scale and context; such systems often require significant investment and external infrastructure.

In summary, the participating Peshawar hotels have implemented a patchwork of circular economy practices, mainly concentrated in the middle range of the 9R framework. The most common actions revolve around reducing consumption, reusing existing materials, and recycling waste, which align with both their understanding of circularity and the practical opportunities available to them. A few have moved into more resource-intensive strategies like refurbishing and remanufacturing furniture or fixtures, showing an encouraging willingness to invest in extending product lifecycles. The examples like solar panel installation (to reduce reliance on non-renewable energy) and repurposing waste containers for water storage demonstrate creativity and a proactive approach to resource efficiency. Table 2 encapsulates these findings by showing which CE principles each establishment has put into practice. Importantly, even the most enthusiastic adopter (A4) is still far from a fully circular operation – the efforts are significant but partial. The two establishments with no notable initiatives reflect that some hospitality businesses, particularly smaller or newer ones, may lag in adopting such practices, possibly due to resource or knowledge constraints. The next sections delve into the perceived benefits of these circular initiatives and the challenges that might be hindering broader or deeper implementation.

### Specific Circular Initiatives in Practice

To provide a clearer picture of what the circular economy looks like on the ground in Peshawar's hotels, we detail some specific initiatives identified across the interviews. These initiatives can be grouped into a few categories:

- **Resource-Efficient Energy Use:** Four establishments (A1, A3, A4, A9) have installed solar panels to harness renewable energy for their electricity needs. This move not only lowers their dependence on the grid (which in Pakistan often means fossil-fuel-based power) but has also reduced their operating costs. By generating solar power, these hotels effectively *reduce* their consumption of non-renewable energy and cut down on greenhouse gas emissions associated with their operations. For example, A4's manager noted that solar panels now provide a significant portion of their daytime electricity, and *"on sunny days we run almost entirely on solar"*, which has noticeably decreased their monthly energy bills.

- **Renovation and Refurbishment with Recycled Materials:** Several hotels are incorporating secondary (recycled or reclaimed) materials in renovations and decor. Participants from A2, A3, and A9 described recent renovation projects where they deliberately used recycled wood, metal, or other materials. In one case, a hotel redecorated its lobby using *"timber from old demolished houses"* (A9) polished and repurposed as wall paneling, giving a rustic aesthetic while avoiding new wood purchases. Another hotel (A3) sourced furniture made from reclaimed pallet wood for their café. Such initiatives fall under *refurbish* (upgrading facilities using reclaimed inputs) and demonstrate a tangible circular approach to facility management.

- **Remanufacturing and Repairing Furniture:** As noted earlier, two establishments (A4, A9) practiced remanufacturing furniture. Instead of buying brand new furniture, these hotels worked with carpenters to rebuild and upgrade existing pieces. In addition, routine repair of furnishings, equipment, and fixtures was a common practice mentioned by many (which is expected in hospitality to save costs). What makes A4 and A9 notable is the extent – they have a system in place for remanufacturing: collecting worn-out furniture, partnering with a workshop, and returning essentially "good as new" items into service. This goes beyond ad-hoc repairs and reflects an embedded circular practice. Other hotels also emphasized maintenance: for instance, A5's supervisor mentioned that *"we have a maintenance team that fixes everything from plumbing to furniture, so we seldom throw things away unless truly beyond repair."* This ethos of repair aligns with extending product life and reducing waste.

- **Waste Repurposing and Recycling:** All establishments that had any sustainability initiatives were engaged in basic recycling – typically sorting recyclables (paper, cardboard, plastic bottles, glass) and either sending them to recycling facilities or, in some cases, giving them to local waste collectors who onward sell to recyclers. While recycling is a conventional practice, one hotel (A1) took a step further with a creative repurposing effort. As mentioned, they repurposed large used oil drums as water storage tanks, integrating them into their *water saving system*. This clever reuse not only saved money on buying new water tanks but also kept metal drums out of the waste stream. Additionally, a couple of hotels (A8, A10) mentioned reusing items like glass jars or bottles for storage and decoration, and reusing graywater (lightly used water, e.g., from laundry) for gardening – though the latter was done informally by one guesthouse (A10) by simply collecting rinse water for plants. Food waste management, however, was one area not strongly addressed by most; only one hotel (A4) said they occasionally send food scraps to a local farmer for use as animal feed, which is a rudimentary form of waste-toresource conversion.

These initiatives illustrate that the participating hotels are finding practical ways to implement circular principles within their operational constraints. Many of these efforts are relatively lowtech and rely on ingenuity and local collaboration – for instance, repurposing containers, sourcing reclaimed materials, or

working with local craftsmen to remanufacture furniture. This is characteristic of an environment where formal recycling and industrial support for circular practices may be limited; businesses compensate through creative, grassroots solutions.

## Perceived Benefits of Circular Practices

The interviews revealed several key benefits that managers perceive from adopting the above circular/sustainable initiatives:

1. **Cost Savings:** The most frequently cited benefit was cost reduction. Seven out of ten participants explicitly mentioned saving money as a result of their initiatives. Solar panels (where implemented) led to significant electricity savings. Reusing and remanufacturing furniture reduced procurement costs. As one manager put it, *"following the circular economy rules is important because it saves costs"* (A1, echoed by A8 and A10). In resource-constrained settings, this financial motivation is a powerful driver – even more so than any formal environmental commitment. The cost perspective was often immediate (monthly bills, purchase expenses), making it a clear win for these businesses.

2. **Reduced Pollution and Environmental Impact:** Many participants linked their actions to environmental benefits, especially pollution reduction. By reducing waste sent to landfills and cutting use of diesel generators (thanks to solar power), they felt they were contributing to a cleaner environment. Respondents A1, A4, and A9 all commented in similar terms that *"it decreases pollution"* and helps address environmental problems. This shows an awareness that even local actions (like less garbage burning or lower emissions) make a positive difference in their community's environment. A couple of hoteliers also mentioned global issues: one noted *"we do these things because we know about climate change – every little bit less energy we use, less pollution we make, is good"* (A9), indicating a consciousness of broader sustainability goals.

3. **Operational Efficiency and Service Quality:** Three interviewees suggested that circular practices improved their operational efficiency or the quality of service. For example, by carefully managing resources (energy, water), they could run the hotel more reliably and allocate savings to other service improvements. One respondent (A1) said that efficient resource use led to smoother operations, and gave an example: their solar power system not only cut costs but also provided backup power during grid outages, ensuring guest services were not interrupted – a clear operational benefit in a city where electricity supply can be erratic. Another (A9) noted that by emphasizing reuse and maintenance, the hotel maintains its equipment better, resulting in fewer breakdowns and thus more consistent service for guests. These points highlight that beyond direct cost or environmental factors, there are *indirect benefits in resilience and reliability* gained from circular thinking.

4. **Brand Image and Customer Satisfaction:** Although not universally emphasized, a few managers recognized that eco-friendly initiatives improved their hotel's reputation and could attract guests. Participant A3 mentioned that some tourists *"choose us because they notice we care about sustainability"*, citing positive comments from guests about solar panels and recycling bins visible on the property. In the competitive hospitality market, a green image can be a selling point. However, it's worth noting that this benefit was mentioned less frequently than internal benefits like cost savings, suggesting that in Peshawar's current market, customer demand for green hotels is still emerging and not yet a primary driver for most businesses.

In summary, the respondents view their circular economy efforts as creating a win-win in several ways: saving money and improving efficiency (business wins) while also reducing environmental harm (societal

win). This alignment of economic and environmental incentive is crucial for the long-term viability of such practices. It reinforces findings from other contexts that many circular strategies can bolster the bottom line while advancing sustainability. The positive experiences reported – such as significant energy savings from solar or durability gains from remanufactured furniture – can serve as encouraging examples for other hospitality businesses considering similar steps.

### Challenges and Barriers to Implementation

Despite the generally positive outcomes, the interviewees also discussed various challenges and barriers they faced in implementing circular economy principles. Understanding these obstacles is essential, as they shed light on why some CE strategies remain underutilized and what is needed to accelerate circular adoption in the hospitality sector of a developing city. The main challenges identified include:

- **Limited Awareness and Expertise:** A common theme was that knowledge gaps exist – both among management and staff – regarding advanced circular practices. While basic ideas like recycling are known, more complex concepts (e.g., grey water systems, biodegradable materials, or new business models) are not well understood. Two managers (A5, A8) admitted that they themselves *"are still learning"* about what more they could do beyond the current measures. Staff training was mentioned as an issue by A4: *"It's not easy to get everyone (staff) on the same page; some still treat everything as disposable because they don't know better."* In the absence of widespread awareness, introducing new practices can be slow. This challenge aligns with global observations that lack of knowledge and expertise is a key barrier to CE in hospitality.

- **Financial Constraints and Initial Costs:** Implementing certain circular solutions often requires upfront investment, which can be daunting for smaller businesses. For instance, solar panel installation and setting up rainwater harvesting or composting systems involve significant initial expenses. Participant A3 noted that *"the ideas are good but sometimes not affordable at the start"* – their solar project, for example, only materialized after securing a low-interest loan. Similarly, using higher-cost eco-friendly materials or products (like biodegradable amenities or energy-efficient appliances) can strain budgets. A6, one of the newer establishments, pointed out that as a startup they had *"other priorities like basic equipment and marketing"*, so sustainability upgrades had to wait. This indicates that even if owners are interested, financial hurdles can delay or prevent implementation.

- **Lack of Infrastructure and Recycling Facilities:** Several respondents highlighted external infrastructure issues. Reliable waste management and recycling facilities in Peshawar are limited. A9's manager explained that they would like to do more recycling and even compost organic waste, *"but the city doesn't have the facilities – we struggle to find buyers for recyclables sometimes, and there's no industrial compost around."* This lack of a supportive ecosystem means hotels must often manage on their own or at small scale. The absence of organized recycling pickup, for example, makes it cumbersome to recycle consistently (some hotels resort to informal arrangements with waste pickers). In addition, there is no local supplier or system for certain circular processes – e.g., no local biogas plant to take food waste, no textile recycling for old linens – which limits what individual hotels can practically do with their waste other than basic recycling. This barrier reflects what Bittner *et al.* (2024) found in emerging economies like Indonesia: weak infrastructure significantly hampers CE implementation.

- **Policy and Regulatory Gaps:** None of the interviewees reported any government incentives or strong regulations pushing them towards circular practices. A couple of managers (A2, A8)

voiced that more support or pressure from authorities could help – for instance, *"if the government gave a tax break for solar or penalized heavy waste generators, more people would act"*. The current policy environment was described as neutral at best; while there are general environmental regulations in Pakistan, enforcement in the hospitality sector is lax, and there are no specific circular economy guidelines or support programs for businesses. This lack of external drivers means progress relies entirely on individual initiative. The managers implied they would welcome clearer government direction or programs (like subsidies for green technology or public awareness campaigns) to reinforce their efforts.

- **Cultural and Customer Attitudes:** A subtle barrier mentioned by two respondents (A4, A7) relates to customer expectations and behavior. In some cases, attempts to implement circular practices ran into traditional expectations of service. For example, A7 tried encouraging guests to reuse towels more and reduce laundry loads, but *"some guests complained, they want everything fresh daily – they don't care about saving water."*

Similarly, eliminating certain single-use conveniences can risk customer dissatisfaction if not handled carefully. While this was not seen as a major issue by most (many guests reportedly responded positively or neutrally to the hotels' eco-friendly measures), it does underline the need for customer education and balancing service quality with sustainability in hospitality.

Overall, these challenges paint a picture of an environment where internal will may exist, but external support and knowledge are lagging. The hospitality managers of Peshawar who are inclined toward sustainability find themselves navigating financial and informational hurdles largely on their own. Their experiences echo common barriers identified in literature – from insufficient know-how (Kirchherr *et al.*, 2018 noted cultural/knowledge barriers) to structural obstacles like infrastructure and policy voids. The next section will discuss how these findings compare with experiences elsewhere and what they imply for advancing the circular economy in tourism.

## Discussion

This exploratory study provides a snapshot of how circular economy principles are beginning to take hold in the hospitality sector of an emerging economy city. The results highlight a mix of encouraging progress and significant limitations, which merit discussion in the context of global CE developments in tourism.

Alignment with global trends: One of the notable findings is that the circular initiatives adopted by Peshawar's hotels revolve around the classic 3Rs (reduce, reuse, recycle) – a pattern that aligns closely with observations in more developed contexts. Prior research has emphasized that hospitality companies tend to start their circular journey by targeting tangible resource efficiency and waste management issues. Our cases are no exception: measures like energy-saving, water conservation, material reuse, and recycling are the front-line actions. For example, installing solar panels and efficient appliances (reduce), reusing materials in renovations (reuse/refurbish), and instituting recycling programs (recycle) mirror what large hotel chains have done, albeit on a smaller scale. Rodríguez-Antón & Alonso-Almeida (2019) found that even major European hotel groups were primarily focusing on energy, water, and waste reduction initiatives in their CE strategies. The Peshawar hotels similarly concentrated on these domains, suggesting that certain low-hanging fruits in circularity are universal: cutting utility consumption and managing waste are both economically and environmentally sensible irrespective of location.

**Partial and incremental adoption:** However, the scope of CE adoption in our sample is partial, reflecting an *incremental approach* rather than a radical transformation of business models. None of the hotels

have yet embraced the more transformative R-strategies like refuse (questioning the need for certain products or services) or fundamentally rethinking their value proposition to incorporate circular economy (such as shifting to service-based models, sharing assets with other businesses, etc.). In comparison, the concept of *circular business models* in tourism – for instance, rental or sharing systems for seldom-used equipment, or take-back programs for materials – remains largely theoretical at this stage in Peshawar. This finding resonates with the literature's indication that most hospitality businesses are still in early stages of circularity, evolving from basic sustainability practices rather than leaping into fully circular operations. The case of A4 (which implemented five principles) shows that a motivated hotel can push the envelope (including remanufacturing, which is relatively advanced for this sector), but even A4 did not venture into refusing low-value conveniences or redesigning its business model beyond operational tweaks.

**Contextual challenges in emerging economies:** The study underscores that while the *types* of initiatives may be similar across contexts, the *degree of implementation* and the challenges faced can differ in emerging markets. A clear example is the lack of external infrastructure – our participants expressed difficulty in executing CE strategies that depend on external systems (like advanced recycling or composting) because those systems are underdeveloped locally. Bittner *et al.* (2024) similarly noted that Indonesian hotels (emerging context) struggled with weak waste management infrastructure and enforcement, whereas Dutch hotels (developed context) did not cite infrastructure as a major issue. In Peshawar, the absence of municipal recycling services or easy access to circular supply chains means that even if a hotel wanted to, say, send food waste for biogas production or procure all furniture as refurbished, the practical means to do so are limited. This highlights a crucial point often raised in CE discussions: the success of circular economy initiatives is partly systemic, requiring collaboration and networks beyond individual firms. In developing contexts, those networks (suppliers of recycled materials, waste processors, etc.) may be missing or informal, putting more onus on individual businesses to find ad hoc solutions.

**Knowledge and cultural factors:** Another aspect is the role of knowledge and culture. The managers in our study were generally enthusiastic about sustainability, but their understanding of "circular economy" was mostly self-taught or intuitive. This contrasts with some developed countries where formal training or industry guidelines on CE are slowly emerging. The limited awareness we observed among staff and even some management supports the notion that capacity-building is needed to broaden the implementation of CE. Encouragingly, the concept resonated once explained – the fact that eight out of ten could relate it to reuse/repair suggests that framing CE in familiar terms (like 3Rs) is effective for engagement. Nonetheless, to move from basic recycling to more sophisticated circular strategies, hospitality professionals in Pakistan likely need exposure to best practices and technical knowledge (for example, how to set up a grey water reuse system, or where to source remanufactured goods).

The slight cultural resistance noted – such as guests expecting traditional service or staff being used to linear routines – also indicates that change management is part of the challenge. As Sorin & Sivarajah (2021) pointed out in a different context, organizational culture in hotels can be slow to change and may prioritize guest comfort and convenience over sustainability unless a concerted effort is made. Our findings concur that any circular initiative in hospitality must consider guest experience and staff routines. In cases where it was handled well (e.g., communicating towel reuse to guests or training staff to separate waste), the practices were accepted; where it wasn't, pushback occurred (as with some guests not understanding the towel policy). This suggests that education and communication are as

important as the technical implementation of circular solutions.

**Benefits driving adoption:** It is instructive that the benefits experienced align with theoretical expectations of CE but are realized in very concrete ways for these businesses. Cost savings came through strongly, validating the economic rationale for many circular actions. This finding is significant because it provides a compelling argument to persuade other businesses – in a price-competitive industry like hospitality, demonstrating that solar panels or waste reduction measures can cut costs is often the most persuasive case for adoption. The environmental motivations, while present, were often couched in terms of local impact (reducing visible pollution, complying with ethical norms) rather than abstract global benefits, which is understandable. As CE literature indicates, win-win outcomes (economic and environmental) greatly facilitate the uptake of circular practices. Our study adds evidence that such win-wins are indeed being realized on a micro scale in Peshawar's hotels: for example, A1's dual benefit of saving power costs and ensuring backup power (resilience) through solar is a strong demonstration of CE's practical value.

**Comparative insight – developed vs. developing contexts:** When comparing these findings with cases from developed countries, a nuanced picture emerges. In absolute terms, Peshawar's hospitality sector is behind in implementing CE – none of the participants had the breadth of initiatives that some European hotel chains report (like comprehensive sustainability certification programs, circular procurement policies, etc.). However, in relative terms – considering the constraints – the efforts are significant and in some ways innovative. The use of reclaimed materials for renovation or repurposing oil drums for water is evidence of a *frugal innovation* approach to circularity, making the most of limited resources. This bottom-up ingenuity can complement the top-down, technology-heavy solutions seen elsewhere. It also highlights an insight for theory: circular economy practices can be adapted to fit local contexts and resource availability. Rather than waiting for sophisticated recycling plants, these hotels found immediate actions within their control. Such adaptive practices might not cover the entire circular loop but represent meaningful progress.

Implications for scaling up CE in hospitality (Pakistan and similar contexts): The discussion above implies several steps that could help scale circular economy adoption in hospitality:

- **Capacity Building:** Training programs and knowledge-sharing platforms are needed to expose hoteliers to a wider array of CE strategies (beyond the basics) and how to implement them. This could involve workshops by tourism bodies or partnerships with academia to translate CE research into practical guidelines for hotels.

- **Infrastructure and Policy Support:** Government and industry associations in Pakistan should invest in better waste management and recycling infrastructure, and consider incentives such as grants or tax rebates for hotels that implement renewable energy, water recycling, or other circular systems. For instance, subsidizing solar panel installations for hotels or providing recycling pickup services could significantly lower barriers. Our findings show that the existing policy vacuum means voluntary actions only go so far; a more enabling environment could accelerate and broaden the adoption.

- **Peer Learning and Recognition:** Within the local industry, recognizing and rewarding hotels that pioneer circular practices could motivate others. If, say, a city tourism board awards "Green Hotel" status or similar recognition (with marketing benefits) to those meeting certain circular criteria, it creates a healthy competition and knowledge exchange. The cases like A4 or A1 can serve as local champions, demonstrating feasibility to their peers.

- **Integration with Customer Experience:** To overcome any cultural or guest-related barriers, hotels should integrate circular practices in ways that enhance or at least do not detract from customer experience. Our study suggests that when explained well, guests often appreciate such initiatives. For example, A3 received positive feedback for visible eco-friendly measures. This implies hotels can actually leverage their circular actions as part of their brand story, turning a potential challenge into a marketing point.

In linking back to the broader literature, our study supports the idea that circular economy in tourism is still at a formative stage, but even early adopters in developing regions are finding value and viability in it. This case from Peshawar adds to the body of knowledge by showing that many principles of CE (like reuse, refurbish, remanufacture) are applicable and beneficial even in a context without advanced infrastructure. It also echoes findings from other sectors that emerging economies may leapfrog in certain areas of sustainability when the right conditions are met. For example, facing unreliable grids, some hotels went straight to solar energy, which aligns with the notion of leapfrogging to greener technology.

There are, of course, limitations to our study that temper the generalizations. The sample size is small and focused on a subset of proactive businesses; thus, it likely paints a somewhat optimistic picture compared to the average hospitality business in the region. Less proactive or resourceful establishments might struggle even more with circular adoption. Additionally, our data is self-reported and qualitative; we did not measure environmental outcomes or cost savings quantitatively, which would be a useful follow-up. Future research could expand to more hotels, include quantitative assessments (e.g., how much waste reduction or energy savings were achieved), and perhaps compare multiple cities or regions to see if Peshawar's case is unique or part of a larger trend in Pakistan.

In conclusion, the discussion reaffirms that transitioning to a circular economy in hospitality is a journey of incremental changes building towards a paradigm shift. Peshawar's hotels are at the early steps of this journey. They demonstrate that even under constraints, tangible circular practices can take root, driven by a mix of economic sense and environmental responsibility. The convergence of our findings with global insights – such as the dominance of 3Rs and the existence of common barriers – suggests that many lessons learned elsewhere are relevant in Pakistan, but local innovation and policy support will be key to advancing further. The next section provides final remarks and specific recommendations drawn from these insights.

## Conclusion

This study set out to rewrite the narrative of how circular economy principles can be applied in the tourism and hospitality industry of Peshawar, Pakistan. Through qualitative case studies of ten local establishments, we gained a detailed understanding of current practices, motivations, and challenges related to circularity in this context. Our findings highlight both promising strides and areas needing growth:

- **Promising Strides:** Even in the absence of formal frameworks or strong external drivers, several hotels in Peshawar have independently adopted circular-like practices. They have focused on the core principles of reduce, reuse, and recycle, implementing measures such as renewable energy use (solar panels), recycling and waste reduction programs, reusing materials in renovations, repairing and remanufacturing furniture, and repurposing waste items. These initiatives have yielded concrete benefits – notably cost savings and reduced environmental impact – which validate the practical value of a circular approach for businesses. The fact that managers uniformly recognize sustainability's importance and can relate to CE concepts (at least

in terms of 3Rs) is an encouraging sign that the mindset shift towards circular thinking is underway. In essence, these hospitality businesses are taking incremental but important steps toward a more circular model of operation, improving their resource efficiency and demonstrating environmental stewardship.

- **Areas for Growth:** The application of CE in Peshawar's hospitality sector remains partial and ad hoc. Key circular economy strategies such as *refuse, rethink,* and *recover* are largely missing from the current landscape, reflecting a still-limited conceptual reach

  and capability. Challenges impeding broader adoption include knowledge gaps (many stakeholders are not familiar with advanced CE practices), financial and operational constraints (limited capital to invest in new technology or processes, and the need to prioritize day-to-day operations), and systemic issues (lack of recycling infrastructure and minimal policy support). Our study revealed that without supportive infrastructure or incentives, hotels can only go so far on their own – for instance, they can sort waste but rely on the city's capacity to actually recycle it. There is ample room to expand circular initiatives, from comprehensive waste management (like composting organic waste or collaborating in a city-wide recycling program) to rethinking certain service offerings (perhaps adopting digital solutions to reduce paper use, or partnering with other businesses to share resources).

## Recommendations

Based on the findings, we propose several recommendations for different stakeholders to accelerate the transition to a circular economy in the hospitality sector of Peshawar and similar contexts:

1. **For Hospitality Businesses (Micro-level):** We encourage hotels and restaurants to build on the proven successes of 3R initiatives and gradually explore further circular actions. This could involve conducting a simple *circular audit* of their operations – identifying waste streams and underutilized resources – and then seeking creative ways to eliminate waste or find value in those streams. For example, hotels could partner with local farms to send food waste for animal feed or compost (addressing "recover"), or collaborate with artisans to upcycle hotel waste (broken ceramics or bottles) into saleable crafts (turning waste into a resource and perhaps even a guest attraction). Importantly, businesses should also invest in staff training and guest communication about their sustainability programs. As our results showed, educated staff and informed guests are more likely to support and participate in circular practices (like towel reuse or recycling in rooms).

2. **For Industry Associations and Educational Institutions (Meso-level):** The hospitality and tourism associations in Pakistan, along with universities and vocational training institutes, should take a proactive role in disseminating knowledge about circular economy. They could develop workshops, guidelines, and case studies tailored to the local industry – essentially translating global best practices into local action plans.

   Recognizing and rewarding pioneers (through green awards or certifications) would motivate other businesses to follow suit. Moreover, creating forums for hotels to share experiences (challenges and successes) can facilitate peer learning. For instance, if one hotel has a great experience with solar energy or grey water reuse, others can learn from their implementation process, vendors used cost-benefit, etc. This peer support network can reduce the trial-and-error burden on individual businesses.

3. **For Government and Policymakers (Macro-level):** There is a clear need for policy intervention and infrastructure development to enable circular tourism on a larger scale. Policymakers

should consider introducing incentives like tax credits or grants for hospitality businesses that invest in renewable energy, water recycling, or other circular technologies. Simultaneously, developing city-level waste management systems (e.g., recycling facilities, organized waste collection, composting sites) will directly amplify the impact of individual business efforts. Regulations can also play a role: even simple mandates – for example, requiring hotels above a certain size to have a waste separation program, or banning single-use plastics in hotel operations – could push laggards to act and create a level playing field. Importantly, these policies should be crafted in consultation with the industry to ensure they are realistic and effectively supported. Given that Pakistan has expressed commitment to sustainable development goals, integrating circular economy principles into tourism development plans at the provincial or national level could be a strategic move, positioning the country as forward-looking in sustainable tourism.

4. **For Researchers and Practitioners (Future Research):** This study provides a foundation, but further research is warranted to monitor and evaluate circular economy adoption in tourism. Longitudinal studies could track the progress of these and other hotels over time, quantifying the environmental and economic outcomes of their initiatives. Comparative studies between cities or countries could shed light on how cultural, economic, or regulatory differences influence circular implementation. Additionally, action research involving pilot projects (for instance, implementing a new circular solution in a hotel and studying the process) would be valuable to test what approaches work best in the Pakistani hospitality context.

In conclusion, moving the hospitality industry toward a circular economy in places like Peshawar is challenging but certainly feasible. Our research reveals a narrative of early optimism – small successes that can be built upon. The hospitality businesses studied are already reaping rewards from their initial circular practices, proving that sustainability and profitability can go hand in hand. With targeted support, increased knowledge, and collective effort, these initial steps can evolve into a broader transformation. Such a transformation holds promise not only for reducing the environmental footprint of tourism but also for enriching the industry's resilience and value proposition. A circular approach encourages innovation, and in a world where travelers are increasingly conscious of sustainability, it can enhance the competitiveness of destinations that embrace it. Peshawar's journey, as detailed in this manuscript, can serve as an instructive example for similar cities striving to reconcile economic growth in tourism with the imperatives of environmental sustainability. The road ahead requires collaboration among stakeholders at all levels, but the destination – a thriving, circular hospitality sector – is well worth the effort for the benefits it offers to businesses, society, and the planet.

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