

A Novel Conceptualization of Green Human Resource Management: Insights from Library and Documentation Science

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Abstract:

This study proposes a new conceptual framework for Green Human Resource Management (GHRM), focusing on its relevance to the library and documentation sector amid increasing sustainability demands. It examines key GHRM practices—such as green recruitment, sustainability-oriented training, and eco-based performance evaluations and aims to construct a model linking HR functions with sustainability principles. The research evaluates the adaptability of these practices to library structures and identifies organizational and technological enablers and barriers. Findings show that GHRM can transform institutional culture, reduce environmental impact, and enhance awareness among staff and users. The study recommends aligning HR policies and training manuals with the Sustainable Development Goals (SDGs) and advocates for a strategic, integrated approach connecting HRM with environmental management.

Keywords: Green Human Resource Management; Green Libraries; Environmental culture; Sustainable institution Transformation; Information.

Jel Classification Codes: XN1, XN2.

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1. INTRODUCTION

In recent years, the world has witnessed a significant rise in environmental awareness, driven by the escalating consequences of industrial pollution, the depletion of natural resources, and the degradation of ecosystems. These pressing challenges have prompted governments and international organizations to adopt more stringent policies aimed at environmental protection and the promotion of sustainability.

Within this evolving context, institutions of all types including information institutions are increasingly called upon to reassess their operational systems and embrace management approaches that align with sustainable environmental frameworks. This shift has given rise to a range of institutional initiatives, most notably: green management, environmental marketing, sustainable supply chains, and Green Human Resource Management (GHRM) (Abou Romman , Al siddiqi , & Ghassan , The impact of adopting green human resource management practices in improving the application of environmental management , 2019,p.13). The latter has emerged as a key strategic pillar in institutional efforts to transition toward environmentally responsible practices This central role is largely attributed to the fact that human capital constitutes the decisive factor in driving sustainable transformations within organizations.

For information institutions particularly libraries and documentation centers the integration of GHRM practices, such as green recruitment, environmentally-oriented training, and performance evaluation based on environmental indicators, does more than merely reduce the ecological footprint of these entities. It also contributes to the cultivation of a sustainable environmental culture within the information work environment. Human resources in such institutions are not merely operational agents; they are active participants in organizational change, shaping attitudes, behaviors, and professional practices in accordance with the principles of sustainability.

Recent literature highlights that adopting a strategic approach to Green Human Resource Management enables information institutions to enhance their environmental performance and achieve greater coherence between their knowledge-based objectives and broader societal missions. These institutions, as entities with a direct influence on public awareness and cultural practices related to the environment, are uniquely positioned to lead by example in fostering environmentally responsible behaviors.

2. PROBLEM STATEMENT

In light of the escalating environmental challenges posed by industrial pollution, ecosystem degradation, and the depletion of natural resources, environmental sustainability has become a central concern in both public policy and institutional agendas on a global scale. This growing emphasis on sustainability has extended to information institutions, which are no longer immune to the sweeping shift toward environmentally responsible practices especially in light of their increasingly prominent role in environmental education and the promotion of collective awareness.

With the rapid expansion of the digital wave, libraries and documentation centers are now compelled to reconsider their administrative and operational models to ensure greater alignment with sustainable environmental frameworks. Within this context, Green Human Resource Management (GHRM) has emerged as a vital strategic approach. By leveraging human capital, GHRM seeks to integrate environmental principles into the institutional fabric through environmentally conscious recruitment policies, the development of training programs focused on

raising environmental awareness, and the implementation of performance evaluation systems based on sustainability standards (El-Behairy & Mohammed , The effect of applying the concept of green human resource management on activating human resource management practice in the egyptian business environment , 2018,p.8).

The adoption of this approach within information institutions opens new avenues for fostering a green institutional culture one grounded in the integration of professional performance and environmental commitment. As educational and community-oriented entities, libraries possess a substantial capacity to influence individual behaviors, not only through their content and services, but also through their operational and managerial models. Through GHRM, such institutions can significantly reduce their energy and paper consumption, enhance recycling initiatives, and develop employee competencies in managing resources and information in a sustainable manner. Moreover, the systematic integration of environmental management into human resource functions strengthens these institutions' readiness to contribute meaningfully to the achievement of the Sustainable Development Goals (SDGs) particularly Goal 13 (Climate Action) and Goal 12 (Responsible Consumption and Production). Thus, GHRM emerges not merely as a managerial option, but as a strategic necessity for transforming libraries and documentation centers into environmentally responsible and influential entities. And the Central Research Problem Based on the above, the study seeks to address the following central research question:

How do Green Human Resource Management (GHRM) practices contribute to enhancing environmental sustainability within information institutions and documentation centers?

To explore this question in depth, the study will address the following sub-questions:

- _To what extent are HR departments in information institutions aware of the importance of implementing GHRM practices?
- _What are the green recruitment and training mechanisms currently employed in libraries and documentation centers, and how effective are they in achieving sustainability goals?
- _What organizational and technological factors facilitate or hinder the implementation of GHRM practices in information institutions?
- _To what degree do GHRM practices contribute to the development of an institutional environmental culture within libraries and documentation environments?

3. Research Objectives

This paper aims to explore the core concepts associated with Green Human Resource Management (GHRM) within the context of information institutions and documentation centers, recognizing them as knowledge-based spaces with growing environmental and societal impact in light of ongoing digital and ecological transformations.

The paper first seeks to establish a theoretical foundation for the key functions of GHRM namely recruitment, training (Al taher & Others, 2011,p.9), and performance evaluation approached from an environmental perspective that enhances institutional capacity to adapt to sustainability demands.

Furthermore, the study proposes a set of variables tailored to the nature of information institutions, aligned with the principles of GHRM. These variables are particularly focused on improving institutional performance efficiency, optimizing resource consumption, and fostering a green

organizational culture that raises environmental awareness among both staff and users within library and documentation work environments.

The paper highlights the pivotal role that Green Human Resource Management can play in achieving a functional and environmental equilibrium within such institutions. It emphasizes the importance of balancing information service performance with the imperatives of sustainable development.

Additionally, it sheds light on the strategic potential of GHRM as a mechanism that enables information institutions to actively contribute to the three dimensions of sustainability environmental, economic, and social. In doing so, it positions human resources as a driving force in facilitating the transformation toward environmentally and socially responsible information systems.

4. RESEARCH SIGNIFICANCE

This study gains relevance amid growing academic and practical interest in Green Human Resource Management (GHRM), particularly within information institutions and documentation centers increasingly pressured to align operations with sustainable development goals. GHRM is an emerging research field focused on embedding environmental and social sustainability into institutional management strategies, ensuring long-term viability and mission fulfillment in a digitally evolving and climate-sensitive context.

As environmental responsibility becomes a core concern, GHRM highlighted has emerged as a key force reshaping internal policies, especially in knowledge-centric institutions (Hamouri & Al-sharabati, 2017,p45).

In response to accelerating environmental changes and related operational challenges, information institutions must adopt a green organizational culture across all areas from recruitment and training to performance management and the development of low-impact, smart environments.

This strategic shift supports resource efficiency and carbon footprint reduction, while enhancing institutional creativity and positioning human resources as a catalyst for both environmental and knowledge sustainability.

5. RESEARCH METHODOLOGY

This study adopts a descriptive-analytical methodology aligned with its objective of exploring the applicability of Green Human Resource Management (GHRM) within information institutions and documentation centers. The methodological framework is built upon an extensive review of relevant literature, including the works (Al-Zoubaidi & Hamza, 2018,p73-91), as well as the analysis of data drawn from recent academic studies, professional reports, and specialized references in library and information science such as the Online Dictionary for Library and Information Science (ODLIS) and the CANDLE database. This approach aims to establish a conceptual link between green management principles and professional practices in information institutions, while accounting for their organizational and operational specificities. To ensure consistency and academic rigor in referencing, the study follows the ISO 690 international documentation standard (1st ed., 2010).

Within the context of information institutions, GHRM represents a strategic management approach that integrates traditional HR functions with environmental sustainability objectives, aligning closely with the educational and societal missions of libraries and documentation centers,

GHRM (Al-sakarneh , 2021,p.19) positions human resources at the core of institutional efforts to foster environmental responsibility by adopting operational policies that reduce resource consumption and promote sustainable behaviors.

Practically, this approach is reflected in environmentally conscious recruitment, training on sustainable technology use, and performance evaluation aligned with eco-friendly indicators. It also involves promoting an environmental culture through initiatives such as recycling programs, energy and paper conservation, and the adoption of digital solutions like electronic catalogs and digital resources in place of traditional paper-based systems.

6.The Importance of Green Human Resource Management in Information Institutions

Green Human Resource Management (GHRM) practices play a significant role in bringing about a qualitative transformation within information institutions by fostering an organizational culture based on environmental sustainability principles. This importance can be detailed as follows:

6.1. Improving the Institutional Image

Today's libraries and documentation centers increasingly rely on their community and professional image to attract partners, researchers, and beneficiaries. Implementing GHRM enhances this image by positioning the institution as "green" and committed to environmental values, thus increasing its appeal to skilled professionals, volunteers, and funders.

6.2. Enhancing Employee Engagement and Reducing Turnover

By motivating employees to participate in environmental initiatives, such as recycling campaigns or reducing paper consumption, GHRM encourages environmental empowerment within information workplaces, which enhances institutional loyalty and reduces employee turnover rates.

6.3. Increasing Productivity through Sustainable Resource Use

Technologies such as smart lighting, printing on demand, and transitioning to electronic catalogs help reduce waste, positively impacting the institution's operational efficiency, lowering long-term costs, and increasing productivity.

6.4. Reducing the Institution's Environmental Footprint

Information institutions consume large amounts of paper and energy. By implementing GHRM practices, such as remote work or digital management, the environmental impact can be significantly reduced, which is increasingly important in light of national and global policies on environmental protection.

6.5. Improving Overall Performance and Enhancing Competitiveness

The green transformation has become a key institutional criterion in international evaluations. Information institutions adopting GHRM are better positioned to obtain green certifications, compete for funding, and engage in sustainable partnerships.

7. Definition of Green Human Resource Management (GHRM)

This section delineates the conceptual foundations of GHRM, emphasizing its definitions, relevance, and functional scope.

7.1. Conceptual Definition of GHRM

Green Human Resource Management (GHRM) represents an evolving field that synergizes environmental sustainability with conventional HR practices. It positions HR as a catalyst for

ecological stewardship by institutionalizing policies that reduce resource consumption and promote eco-conscious behaviors. Academics characterize GHRM as the strategic integration of HR functions recruitment, training, performance evaluation with sustainability objectives, cultivating employee engagement in environmental initiatives while embedding green norms into corporate culture. The ultimate aim is to harmonize organizational efficacy with ecological resilience (Al-born & Fayes, 2019,p.4), tackling environmental crises through innovative HR frameworks. Operationally, GHRM merges HRM with environmental management via practices like waste recycling, cost efficiency, and ecosystem conservation.

7.1.1. Significance of Green Human Resource Management

Green Human Resource Management (GHRM) practices play a pivotal role in fostering a culture of sustainability within organizations while enhancing their competitive advantage, yielding key benefits such as:

- _Enhancing the organization's public image and strengthening its employer brand, _thereby attracting top-tier talent more effectively,
- _Improving employee engagement and increasing retention rates,
- _Boosting productivity through sustainable resource utilization,
- _Minimizing the organization's environmental footprint,
- _Strengthening competitiveness and elevating overall organizational performance.

7.1.2. Green Human Resources Management Objectives

GHRM seeks to achieve the following objectives:

- _Assisting organizations in managing and evaluating the environmental impact of their activities, products, and services (Lakhal, 2016,p.65).
- _Improving environmental performance by rationalizing natural resource consumption,
- _Incorporating environmental considerations into decision-making and long-term policy implementation,
- _Integrating sustainability requirements into strategic planning,
- _Ensuring consistent compliance with environmental legislation.

8. The Core Functions of Green Human Resource Management (GHRM) in Information Institutions and Their Role in Supporting Institutional Sustainability

Green Human Resource Management (GHRM) plays a vital role in embedding environmental principles into HR practices. This study explores the core GHRM functions in information institutions and how they contribute to institutional sustainability. These functions are as follows (Bilal & Semlahi, 2022,p.22):

8.1.Green Recruitment in Information Institutions

Green recruitment functions as a strategic tool for cultivating an environmentally responsible organizational culture within information institutions. It involves prioritizing candidates who demonstrate awareness of and commitment to sustainability. During the hiring process, attention is given to applicants with knowledge of green economics, recycling practices, and energy-efficient workplace habits. Job descriptions often outline eco-related responsibilities such as promoting paper reduction, participating in environmental initiatives, or supporting sustainable technology use. Furthermore, digital documentation centers may seek specialists in green data archiving to design systems that reduce carbon emissions associated with paper-based storage. By integrating environmental criteria into recruitment, institutions align their human capital with

sustainability objectives. This alignment not only strengthens institutional values but also supports a broader transition toward greener operational practices and long-term environmental responsibility.

8.2.Green Training in Information Institutions

Green training initiatives are vital to equipping staff with the knowledge and skills necessary for environmentally sustainable work practices. These programs expand beyond technical instruction to include training on energy conservation, digital documentation, and office waste management. Topics might include “Sustainable Digital Libraries,” “Paperless Work Environments,” or “Eco-Conscious Workplace Practices.” The aim is to foster behavioral change through environmental awareness and to encourage staff to propose eco-initiatives within their roles. Effective programs incorporate feedback tools, surveys, or performance assessments to evaluate knowledge uptake and real-world application. Such training not only supports individual development but embeds sustainability into the organizational culture. By promoting environmentally literate staff, institutions can transition from isolated green actions to systemic, enduring sustainability strategies across departments and services.

8.3.Environmental Performance Evaluation in Information Institutions

Environmental performance evaluation serves as a fundamental component of Green Human Resource Management (GHRM), ensuring that sustainability goals are integrated into institutional operations. Unlike traditional evaluations that focus solely on productivity, green performance reviews assess adherence to environmental standards. Criteria may include paper usage reduction, use of energy-efficient systems, recycling participation, and engagement in institutional green initiatives. Tailored metrics, such as the ratio of digital to printed resources or compliance with energy-saving protocols, provide measurable outcomes. These evaluations not only align employee behavior with sustainability targets but also motivate staff by recognizing eco-friendly contributions. Moreover, performance data contributes to comprehensive sustainability reports, informing policy refinements and guiding future initiatives. Ultimately, these assessments reinforce environmental accountability while enhancing the institution's reputation as a socially responsible information center.

9. The 2030 Agenda for Sustainable Development - A Global Vision for a Better Future

The 2030 Agenda for Sustainable Development (Stands, 2013p.p.25-46) is one of the most prominent comprehensive strategic projects launched by the United Nations, it was officially adopted by all Member States in September 2015, this plan is the culmination of a long process of international consultations and intensive deliberations involving 193 countries, in addition to representatives of global civil society, and it was stipulated in UN General Assembly Resolution A/RES/70/1, entitled "Transforming our world: the 2030 Agenda for Sustainable Development". The plan includes 17 global sustainable development goals, subdivided into 169 interconnected targets, which together form an integrated framework for achieving economic, social, and environmental development simultaneously, where this agenda aims to address the most prominent challenges facing the world today, such as eradicating poverty, gender equality, climate action, ensuring quality education, and promoting peace, among others.

This plan can be viewed as a collective roadmap for building a more just, sustainable, and

inclusive future for all peoples of the world, especially in light of the complex environmental and social crises facing the world. The plan also reflects a shared commitment by countries to achieving human well-being without compromising the rights of future generations to the planet's resources.

While implementing these goals requires concerted efforts at the local, regional, and international levels, their success depends on the integration of public policies, the effectiveness of institutions, and the engagement of civil society, the private sector, and academic institutions in developing sustainable solutions.

It has become crucial for academic and research institutions, including libraries and documentation centers, to engage in supporting the Sustainable Development Goals by providing knowledge, facilitating access to information, and building intellectual and research capacities capable of influencing policy and decision-making.

In light of the above, the 2030 Agenda is not merely a UN document, but rather a universal human vision that aims to build a more balanced world between people and nature, based on the principles of justice, equality, and sustainability.

9.1 The 17 Sustainable Development Goal

The Sustainable Development Goals of the United Nations 2030 Agenda, known as the 2030 Agenda for Sustainable Development, consist of 17 global goals set to address the major challenges facing humanity and achieve comprehensive and balanced environmental, social, and economic development by 2030; These goals are detailed below (Hauke, 2013,p.p.97-101):

- _No poverty.
- _Zero hunger.
- _Good health and well-being.
- _Quality education.
- _Gender equality.
- _Clean water and sanitation.
- _Affordable and clean energy.
- _Decent work and economic growth.
- _Industry, innovation, and infrastructure.
- _Reducing inequalities.
- _Making cities and human settlements inclusive, safe, resilient, and sustainable.
- _Responsible consumption and production.
- _Climate action.
- _Life below water.
- _Life on land.
- _Peace, justice, and strong institutions.
- _Partnerships for the Goals.

10. Technical Standards and Specifications for Constructing Green Libraries Based on Internationally Recognized Criteria

In light of the global focus on environmental sustainability, it has become essential to adopt internationally recognized standards for constructing green buildings (Connell, 2010,p.76), including libraries. One of the most widely accepted frameworks is the LEED (Leadership in Energy and Environmental Design) system, developed by the U.S. Green Building Council and

adopted in over 30 countries. LEED provides comprehensive guidelines for assessing the sustainability of various building types, including educational and cultural facilities like libraries. Key aspects of green library design include careful site selection, ensuring minimal environmental impact, resilience to natural hazards, and accessibility via sustainable transportation. Water conservation is another priority, achieved through low-flow fixtures, rainwater harvesting, and the use of native, low-irrigation landscaping. Energy efficiency is addressed by maximizing natural lighting, using high-performance HVAC systems, integrating motion-sensor technologies, and adopting renewable energy sources like solar panels.

Additionally, the use of sustainable building materials such as recycled or locally sourced products, and alternatives like treated bamboo reduces the building's carbon footprint and waste. Indoor air quality is safeguarded through effective ventilation, low-emission materials, and air quality monitoring, creating a healthy environment for users and staff. Lastly, operational and maintenance practices play a vital role in long-term sustainability by incorporating resource-efficient procedures, eco-friendly cleaning products, and preventive maintenance programs.

Beyond technical requirements, green library design embodies a broader ethical and cultural commitment to environmental responsibility. These standards not only enhance operational efficiency but also position libraries as active contributors to environmental awareness and sustainable development within their communities.

10.1.Key Practices in Sustainable Building Design

Sustainable building design is an integrated approach focused on creating environmentally efficient structures that optimize the use of natural resources while minimizing negative impacts on the environment and human health throughout the building's life cycle from planning to operation and maintenance (Kumar, 2014,p.95). One of the primary practices is integrated design, which emphasizes collaboration across disciplines architecture, engineering, and environmental systems from the planning stage. This ensures synergy between building systems and prevents costly conflicts later. Involving energy and ventilation experts early on can optimize window placement to reduce air conditioning needs. Another essential practice is the utilization of natural resources, which reduces reliance on industrial energy. Strategies include natural ventilation, daylighting through skylights and vertical openings, using thermal mass to regulate indoor temperatures, and positioning the building to harness solar and wind energy, all of which help reduce energy consumption while maintaining comfort.

Energy efficiency plays a vital role, involving the use of high-efficiency HVAC systems, LED lighting, smart controls for lighting and ventilation, renewable energy sources like solar panels and wind turbines, and advanced insulation and double-glazed windows to minimize energy loss. Efficient water management is also critical, achieved through low-flow fixtures, rainwater harvesting for irrigation, greywater recycling for cleaning or landscaping, and efficient water distribution systems to minimize leakage. The use of environmentally friendly building materials is a key focus, prioritizing locally sourced materials to reduce transportation emissions, recycled or recyclable materials, low-emission products (such as non-toxic paints and materials free of VOCs), and materials that are reusable at the end of their life cycle, like bamboo as an alternative to timber.

Indoor environmental quality is another key practice, aimed at improving occupant health and comfort through effective ventilation to prevent harmful gases like CO₂, humidity control to prevent mold growth, noise reduction with improved acoustics, and sufficient natural light to reduce eye strain. Sustainable design also involves life cycle-based design, which assesses a building's environmental impact throughout its entire life cycle from construction and operation to maintenance and deconstruction or reuse ensuring the building's impact is minimized at each stage. Climate adaptation and resilience incorporate local climate data into the design, ensuring the building is resilient to climate change impacts like heatwaves, water shortages, floods, and high winds, by using durable materials and infrastructure designed to withstand future climate conditions.

Operational flexibility in design ensures that buildings can adapt to future technological or functional changes without requiring major structural alterations, promoting long-term viability. Lastly, community engagement and transparency are vital, involving stakeholders such as students, staff, and the local community in the design and evaluation phases to foster acceptance and promote a broader culture of sustainability. Together, these practices aim to reduce environmental impacts while enhancing comfort, resilience, and the longevity of buildings.

11.Prominent Examples of Green Libraries Worldwide

Green libraries represent a harmonious blend of sustainability and knowledge, designed to minimize environmental impact while maximizing energy efficiency.

Around the world, innovative examples of eco-friendly libraries showcase smart design and sustainable practices in action (Lamis, 2003,pp.31-45).

11.1.My Tree House Library – Singapore

My Tree House Library is the world's first green library for children, located at the Central Public Library in Singapore. Designed as a model of environmental sustainability, more than 3,000 recycled plastic bottles were used in constructing the "Tree of Knowledge" center within the library. Additionally, energy-efficient LED lighting and motion sensors were installed to adjust lighting based on need, reducing electricity consumption. The library also offers educational activities for children to raise environmental awareness, such as workshops and eco-themed storytelling. The library received the "Green Mark Platinum" award from the Building and Construction Authority of Singapore in recognition of its efforts in implementing sustainable environmental standards.

11.2.Roseville Public Library, Ramsey County, Minnesota – United States

The Roseville Public Library was designed to be a model of environmental sustainability, focusing on reducing its ecological impact. The library used locally sourced building materials to minimize carbon emissions from transportation, thereby supporting the local economy and reducing its environmental footprint. A rainwater harvesting system was also installed for irrigation purposes, cutting water consumption by up to 30%. The library's design allows for ample natural light, reducing the need for artificial lighting and enhancing the mental well-being of visitors. This library serves as an example of how sustainability can be integrated into architectural design for the benefit of the community.

11.3.The Chinese University of Hong Kong (CUHK) Library

The Chinese University of Hong Kong Library features a sustainable design that balances modernity with environmental preservation. The library incorporates specialized glass façades

that reduce bird collisions, alongside artificial nesting boxes to support local wildlife. Natural ventilation was designed to reduce the need for air conditioning, cutting energy consumption. Surrounding gardens and green spaces were preserved, enhancing air quality and providing a tranquil environment for visitors. The library has won multiple awards, including the "Green Building Award" from the Hong Kong Green Building Council, in recognition of its efforts to meet environmental sustainability standards.

11.4.National University of Singapore (NUS) Central Library

The Central Library at the National University of Singapore is an exemplary model of integrating sustainable design with modern technology. A solar power system was installed to generate electricity, reducing dependence on traditional energy sources. The library utilized Mass Engineered Timber (MET) in the construction of the library bridge, a sustainable and renewable building material. Smart energy-efficient lighting systems with motion sensors were also implemented to minimize electricity use. The library received the "BCI Interior Design Award" in the Learning Category, acknowledging its commitment to environmental sustainability in interior design.

Given the increasing global environmental challenges, it is crucial to reconsider the design and operation of public facilities, including libraries. Libraries like My Tree House in Singapore, Roseville Public Library, the Chinese University of Hong Kong Library, and the National University of Singapore Central Library showcase how libraries can support environmental sustainability through green design practices. These libraries serve different purposes: public libraries focus on community engagement, university libraries integrate sustainability into academic environments, and specialized libraries like My Tree House educate future generations on environmental awareness.

12. Recommendations

In light of the global shift toward sustainability, it has become essential for libraries of all types to adopt green building standards and sustainable operational practices. The following recommendations summarize best practices derived from leading global models in green library design. These recommendations aim to enhance resource efficiency, improve indoor environmental quality, and reinforce the educational and environmental role of libraries:

_Strengthen partnerships with the local community to ensure sustainable operational support based on local resources (Qutaishat,2018,p.36).

_Implement rainwater harvesting systems for reuse in irrigation and cleaning, reducing water consumption.

_Design flexible spaces that allow natural light and provide natural ventilation, reducing reliance on air conditioning systems.

_Use locally sourced and recycled building materials to support the local economy and minimize carbon footprint.

_Create outdoor green spaces for open reading areas or to host environmental events (Mouhammed , 2019,p11).

_Integrate sustainability into research infrastructure by using renewable energy as a primary source for powering equipment and laboratories.

- _ Establish environmental management units within university libraries to assess environmental performance and develop green operational policies.
- _ Align with educational curricula by creating units within the library focused on environmental awareness and sustainable research.
- _ Install double-glazed glass facades and smart shading technologies to reduce energy consumption.
- _ Expand green and open spaces on campus and within the library, utilizing them for activities that promote students' mental health (American Library Association, 2019,p.55).
- _ Focus on incorporating recycled educational materials into interior design and daily activities._
- _ Organize periodic environmental workshops for children to teach recycling principles, consumption reduction, and home gardening.
- _ Integrate interactive play elements related to the environment into the library's interior design, making sustainability concepts engaging and easy to understand.
- _ Use smart lighting and motion sensors to reduce energy consumption in areas frequented by children (Mehta , Chugan , & Kumar, 2015,47).
- _ Obtain environmental accreditation (e.g., Green Mark) to enhance the library's status as a globally recognized sustainable educational center.

Thus, green libraries of all types play a crucial role in the sustainable solutions for the future of education and culture. Their role extends beyond providing knowledge, contributing to the development of environmentally responsible behaviors and offering a practical model for facilities that combine high performance with environmental responsibility. Therefore, adopting the concept of green libraries should not be seen as merely an aesthetic or architectural choice, but as a developmental and strategic necessity in the face of global climate and environmental transformations.

13.Conclusion

In light of the growing global emphasis on sustainability, libraries are increasingly recognized not only as centers of knowledge but also as vital contributors to environmental responsibility. The recommendations outlined drawn from successful international examples highlight the critical role libraries can play in advancing green practices. By integrating sustainable design, efficient resource management, and community engagement, libraries can significantly reduce their environmental footprint while enriching user experience. Whether through rainwater harvesting, the use of renewable energy, or educational initiatives embedded in their spaces, libraries of all types public, academic, or specialized can serve as active agents in promoting environmental awareness and modeling sustainable behavior. Embracing the green library concept is no longer a design trend, but a strategic necessity for shaping environmentally conscious societies and resilient educational infrastructure.

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