Sustainability in the Digital Age: Balancing Print and Electronic Collections to meet Evolving User Needs

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Abstract— **In the contemporary digital era, libraries and information centres are experiencing a paradigm shift in the way information is acquired, stored, accessed, and disseminated. The rapid growth of electronic resources has transformed traditional library services, raising important questions about sustainability, cost-effectiveness, environmental impact, and long-term accessibility. This study examines the concept of sustainability in the digital age with specific focus on balancing print and electronic collections to meet evolving user needs. Using descriptive and analytical research methods supported by primary survey data and secondary sources, the study analyses user preferences, usage patterns, cost implications, and sustainability dimensions of print and electronic resources. The findings reveal a strong inclination toward electronic resources for accessibility and convenience, while print resources continue to play a vital role in deep reading, preservation, and inclusivity. The study concludes that a hybrid collection development model is the most sustainable approach for libraries in the digital age.**

Index Terms— **Sustainability, Digital Age, Print Resources, Electronic Resources, Library Collections, User Needs, Hybrid Libraries**

I. INTRODUCTION

Libraries have long served as custodians of knowledge, primarily through print-based collections. However, the advent of digital technologies, the internet, and mobile devices has significantly altered information-seeking behaviour. Users now expect instant, remote, and seamless access to information. As a result, libraries have increasingly invested in electronic resources such as e-books, e-journals, databases, and digital repositories.

Despite the rapid digital transformation, print collections continue to hold relevance for academic study, archival preservation, and user comfort. Sustainability in library collection development involves balancing environmental responsibility, economic viability, and social equity. This study explores how libraries can achieve sustainable development by integrating print and electronic resources in a balanced manner.

II. REVIEW OF LITERATURE

Previous studies emphasize the growing importance of sustainability in library management. Researchers have highlighted the environmental benefits of reduced paper usage through digitization, while also acknowledging the hidden environmental costs of digital infrastructure. Studies on user behaviour indicate a growing preference for electronic resources, particularly among younger users and researchers, while print remains significant for long-duration reading and special collections. Literature consistently supports the concept of hybrid libraries as the most effective and sustainable model.

III. NEED OF THE STUDY

The need for the present study arises due to:
- Rapid expansion of digital information resources
- Increasing subscription costs of electronic databases
- Space constraints in libraries
- Environmental concerns related to print production and digital energy use
- Diverse and changing user preferences
- Need for sustainable collection development policies

IV. SCOPE OF THE STUDY

The scope of the study includes:
- Academic and public libraries
- Print and electronic collections
- User satisfaction and preferences
- Economic, environmental, and social sustainability
- Collection development and management strategies

V. LIMITATIONS OF THE STUDY

- The study is based on a limited sample size
- Data is primarily descriptive in nature
- Findings may vary across different types of libraries
- Technological changes may influence future outcomes

VI. OBJECTIVES OF THE STUDY

1. To study sustainability concepts in the digital library environment
2. To analyse user preferences for print and electronic resources
3. To evaluate the advantages and disadvantages of print and digital collections
4. To assess sustainability challenges in collection development
5. To suggest strategies for balancing print and electronic collections

VII. METHODOLOGY OF THE STUDY

- Research Design: Descriptive and analytical
- Data Collection Methods:
- Primary Data: Questionnaire survey
- Secondary Data: Books, journals, reports, websites
- Sample Size: 150 users (students, faculty, researchers)
- Tools for Analysis: Percentage analysis, tables, graphical interpretation

VIII. DATA ANALYSIS, INTERPRETATION, AND DISCUSSION

Table 1: Age-wise Distribution of Respondents

Age Group	Respondents	Percentage
Below 20	30	20%
21–30	60	40%
31–40	35	23%
Above 40	25	17%
Total	150	100%

Interpretation: Majority of respondents belong to the 21–30 age group, indicating active digital usage.

Table 2: Frequency of Library Use

Frequency	Respondents	Percentage
Daily	55	37%
Weekly	60	40%
Monthly	25	17%
Occasionally	10	6%

Interpretation: Most users access library resources daily or weekly, emphasizing the need for efficient and sustainable services.

Table 3: Preference of Resource Format

Format	Respondents	Percentage
Print Only	35	23%
Electronic Only	65	43%
Both	50	34%

Interpretation: The table shows that the majority of users (43%) prefer electronic resources, while 34% prefer a combination of print and electronic formats. This indicates strong support for a hybrid collection model.

Table 4: Reasons for Preference of Electronic Resources

Reason	Percentage
Easy Access	40%
Time Saving	30%
Remote Availability	20%
Search Features	10%

Interpretation
Easy access and time-saving features are the main reasons for preferring electronic resources, highlighting the importance of digital convenience.

Table 5: Purpose of Using Electronic Resources

Purpose	Percentage
Academic Study	45%
Research	30%
Reference	15%
Leisure Reading	10%

Interpretation

The table shows that electronic resources are primarily used for academic study (45%), followed by research purposes (30%). This indicates that digital collections play a crucial role in supporting formal education and scholarly activities by providing quick access to current and reliable information. Reference use accounts for 15%, suggesting that users frequently rely on electronic resources for factual and short-term information needs. In contrast, leisure reading represents only 10%, implying that users still prefer print materials for recreational reading. Overall, the data highlights the importance of electronic resources in academic and research-oriented activities while reinforcing the continued relevance of print resources for leisure and extended reading.

Table 6: Reasons for Preference of Print Resources

Reason	Percentage
Better Understanding	30%
Less Eye Strain	25%
Long-term Reading	25%
Reliability	20%

Interpretation

Print resources are preferred for better concentration and reduced eye strain, especially for extended reading.

Table 7: Sustainability Perception Among Users

Statement	Agree	Neutral	Disagree
Digital resources are eco-friendly	60%	25%	15%
Print resources are still essential	70%	20%	10%
Hybrid model is sustainable	80%	15%	5%

Interpretation

The table reveals that a majority of users (60%) agree that digital resources are environmentally friendly, reflecting growing awareness of sustainability benefits such as reduced paper usage and physical storage requirements. However, 25% remain neutral and 15% disagree, indicating that some users are concerned about hidden environmental costs like energy consumption and electronic waste.

A significant 70% of respondents agree that print resources are still essential, highlighting their continued importance for deep reading, preservation, and user comfort. Only 10% disagree, which confirms that print materials cannot be completely replaced by digital formats.

Most notably, 80% of users agree that a hybrid model is the most sustainable approach, while very few (5%) disagree. This strong consensus suggests that users recognize the value of balancing print and electronic collections to achieve environmental, economic, and social sustainability. Overall, the findings clearly support the adoption of a hybrid collection development model in libraries to meet evolving user needs sustainably.

IX. DISCUSSION

The analysis shows a clear transition toward electronic resources driven by convenience and accessibility. However, continued reliance on print resources highlights the importance of inclusivity and academic depth. Sustainability is best achieved through a balanced approach that considers user needs, cost efficiency, and environmental responsibility.

X. FINDINGS

- Users increasingly prefer electronic resources for academic and research purposes
- Print resources remain important for deep reading and preservation
- Majority of users support a hybrid collection model
- Sustainability requires long-term planning and user-centric policies
- Libraries must balance cost, accessibility, and environmental impact

XI. CONCLUSION

The study concludes that sustainability in the digital age cannot be achieved by relying exclusively on either print or electronic resources. A balanced hybrid

collection model is essential to meet evolving user needs while ensuring economic, environmental, and social sustainability. Libraries must adopt flexible collection development strategies supported by continuous user feedback and technological advancements.

XII. SCOPE FOR FURTHER STUDY

- Longitudinal studies on changing user preferences
- Cost-benefit analysis of open-access resources
- Environmental impact of digital infrastructure
- Role of artificial intelligence in sustainable library management
- Comparative studies across regions and library types

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