

# Promoting Information Literacy for Achieving Sustainable Development Goals: The Role of University Libraries in Bangladesh



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Development Goals: The Role of University Libraries in  
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**DEDICATED**

*-To My Parents*

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## **SUPERVISOR'S CERTIFICATE**

I hereby certify that the present work entitled '*Promoting Information Literacy for Achieving Sustainable Development Goals: The Role of University Libraries in Bangladesh*' is an original research work being submitted by Anita Helen, Assistant Professor, Department of Library and Information Science, National University, bearing Registration No.: 32/2021-2022, Session: 2021-2022 of Dhaka University was carried out this original research work under my supervision.

This is to further certify that it is an original work and suitable for the fulfillment of the degree of Doctor of Philosophy in the Department of Information Science and Library Management from the University of Dhaka. To the best of my knowledge, it is an original piece of research work, and this dissertation has not been submitted elsewhere for any other degree or diploma.

I wish her success.

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## DECLARATION

I do hereby declare that the research entitled '*Promoting Information Literacy for Achieving Sustainable Development Goals: The Role of University Libraries in Bangladesh*' has been conducted within the Department of Information Science and Library Management at the University of Dhaka, as part of the requirements for the award of the degree of Doctor of Philosophy (PhD). This thesis results from my original work, based on personally collected and analyzed data, and supported by relevant scholarly literature duly cited. No part of this thesis has been submitted, either wholly or partially, to any other university or institution for the award of any academic degree or diploma.

I also certify that this work is entirely free from plagiarism and has been prepared in accordance with academic integrity standards.

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## ABSTRACT

The study examines the role of Information Literacy (IL) activities in university libraries of Bangladesh in association with the United Nations Sustainable Development Goals (UN SDGs). The study adopted a quantitative research approach using two structured questionnaires, one for library professionals and another for library users. Quantitative data were analyzed using SPSS software. To complement the quantitative findings, responses to a few open-ended questions were subjected to thematic analysis, offering deeper insights. Additionally, a systematic literature review followed the PRISMA standard to support the study's context and theoretical foundation. Cronbach's Alpha ( $\alpha = .863$ ) and Factor Analysis (with a KMO value of  $.872$ ) confirmed the validity, reliability, and internal consistency of the questionnaire. The research investigates the existing condition of IL initiatives, their alliance with SDGs, and the strategic, institutional, societal, and technical factors prompting IL application.

Guided by six hypotheses, the research assesses the current status, relationship, key factors, user perspectives, impact, and challenges of IL activities through quantitative data collected from 167 librarians and 439 library users. Descriptive statistics reveal a positive impact of IL programs and a strong belief in the relevance of IL for societal development. ANOVA and correlation analyses confirm significant relationships between IL promotion and SDG progress, particularly in areas of user satisfaction, IL impact, and institutional challenges. Despite the positive outcomes, gaps persist in awareness and standardized practices across institutions. The findings highlight the need for strategic policy alignment, standardized IL frameworks, and stronger institutional support to enhance the contribution of university libraries toward the SDGs in Bangladesh. The study also finds significant differences in user awareness and satisfaction level with IL facilities across university and user categories. The ANOVA outcomes confirmed substantial differences in IL awareness and satisfaction among user categories ( $F = 6.23, p = 0.002$ ), with faculty members scoring higher on average than students and researchers.

The attempt contributes to the hypothetical and practical knowledge of IL's role in sustainable expansion by ensuring policy endorsements, best practices, and an outline for incorporating IL into university curricula. It highlights the necessity of academic support, capacity building for library professionals, and amplified relationships in the

national and international arenas. The outcomes offer valuable insights for university authorities, policymakers, and library administrators seeking to control IL for educational impartiality and durable growth in Bangladesh.

**Keywords:** Information Literacy, Sustainable Development, United Nations Sustainable Development Goals (UN SDGs), Library Policy and Strategy, Quality Education, Role of Libraries, Universities of Bangladesh.

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## LIST OF ABBREVIATIONS AND ACRONYMS

| <b>Acronym</b> | <b>Elaboration</b>                                                |
|----------------|-------------------------------------------------------------------|
| ACRL           | Association of College and Research Libraries                     |
| AIUB           | American International University Bangladesh                      |
| ALA            | American Library Association                                      |
| ANOVA          | Analysis of Variance                                              |
| ASIALA         | Asian Library Association                                         |
| AUST           | Ahsanullah University of Science and Technology                   |
| AVE            | Average Variance Extracted                                        |
| BU             | BRAC University                                                   |
| BUET           | Bangladesh University of Engineering and Technology               |
| CE             | Community Engagement                                              |
| CEO            | Chief Executive Officers                                          |
| CILIP          | Chartered Institute of Library and Information Professionals      |
| CPL            | Central Public Library                                            |
| CU             | University of Chittagong                                          |
| CUET           | Chittagong University of Engineering and Technology               |
| DIU            | Daffodil International University                                 |
| DOAJ           | Directory of Open Access Journals                                 |
| DU             | University of Delhi                                               |
| DU             | University of Dhaka                                               |
| DUET           | Dhaka University of Engineering and Technology, Gazipur           |
| EWU            | East West University                                              |
| GDP            | Gross Domestic Product                                            |
| GLA            | Ghana Library Association                                         |
| GPA            | Grade Point Average                                               |
| GIIL           | Guided Inquiry for Information Literacy                           |
| HE             | Higher Education                                                  |
| HEI            | Higher Education Institutions                                     |
| ICT            | Information and Communication Technology                          |
| IFLA           | International Federation of Library Associations and Institutions |
| IL             | Information Literacy                                              |
| ILE            | Information Literacy Education                                    |
| ILSDM          | Information Literacy and Sustainable Development Model            |

|        |                                                                    |
|--------|--------------------------------------------------------------------|
| ILSEF  | Information Literacy Self-Efficacy Scale                           |
| ISLM   | Information Science and Library Management                         |
| IT     | Information Technology                                             |
| IUB    | Independent University Bangladesh                                  |
| IUBAT  | International University of Business Agriculture and Technology    |
| IUT    | Islamic University of Technology                                   |
| JNU    | Jawaharlal Nehru University                                        |
| JU     | Jahangirnagar University                                           |
| JUST   | Jashore University of Science and Technology                       |
| KMO    | Kaiser-Meyer-Olkin                                                 |
| KU     | Khulna University                                                  |
| KUET   | Khulna University of Engineering and Technology                    |
| LIS    | Library and Information Science                                    |
| L&T    | Learning and Teaching                                              |
| MDG    | Millennium Development Goal                                        |
| MIL    | Media and Information Literacy                                     |
| MPhil  | Master of Philosophy                                               |
| NGO    | Non-Government Organization                                        |
| NSU    | North South University                                             |
| OER    | Open Educational Resources                                         |
| ODLIS  | Online Dictionary of Library and Information Science               |
| PCA    | Principal Component Analysis                                       |
| PhD    | Doctor of Philosophy                                               |
| PRISMA | Preferred Reporting Items for Systematic Reviews and Meta-Analyses |
| PSCLE  | Preferences for Smart Classroom Learning Environments              |
| QS     | Quacquarelli Symonds                                               |
| RU     | University of Rajshahi                                             |
| RUET   | Rajshahi University of Engineering and Technology                  |
| SD     | Sustainable Development                                            |
| SDG    | Sustainable Development Goal                                       |
| SHED   | Sustainable Higher Education Development                           |
| SME    | Small and Medium-sized Enterprise                                  |
| SPSS   | Statistical Package for Social Sciences                            |
| STEM   | Science, Technology, Engineering, and Mathematics                  |
| SUB    | Stamford University Bangladesh                                     |

|        |                                                                  |
|--------|------------------------------------------------------------------|
| SUST   | Shahjalal University of Science and Technology                   |
| UAPB   | University of Asia Pacific, Bangladesh                           |
| UGC    | University Grants Commission                                     |
| UIU    | United International University                                  |
| ULAB   | University of Liberal Arts, Bangladesh                           |
| UN     | United Nations                                                   |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNGA   | United Nations General Assembly                                  |
| UN SDG | United Nations Sustainable Development Goal                      |
| USQ    | University of Southern Queensland                                |
| VIF    | Variance Inflation Factor                                        |
| VLE    | Virtual Learning Environment                                     |
| 10-YFP | 10-Year Framework of Programmes                                  |

# Anita Helen

## Promoting Information Literacy for Achieving Sustainable Development Goals: The Role of University Libraries in Bangla...

 University of Dhaka

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**CHAPTER ONE**  
**INTRODUCTION**

## CHAPTER ONE: INTRODUCTION

### 1.1 Prologue

Information Literacy (IL) has become a crucial phenomenon in the digital era, enabling users to effectively traverse the extensive array of information accessible both online and offline. IL encompasses more than just locating and assessing information (ALA, 2000). It also involves the skilled and ethical utilization of knowledge to address issues, make well-informed choices, and make meaningful contributions to society (Rafiq *et al.*, 2020). In an era where societies are becoming increasingly dependent on digital technologies, critically evaluating information and utilizing it for personal, academic, and professional development, it is essential to be well acquainted and skilled with IL at individual and institutional levels. Particularly, the higher education institutions of a country may play a vital role in introducing IL for development.

IL is essential in attaining the United Nations Sustainable Development Goals (UN SDGs), a collection of 17 worldwide objectives established by the UN in 2015 to tackle urgent global issues such as poverty, inequality, climate change, and quality education (UN, 2017). Accession, evaluation, and successful utilization of information are essential for accomplishing SDGs, as information serves as the foundation for this process. SDGs goal 4, known as Quality Education, has a clear correlation with IL. This is because it highlights the significance of providing inclusive and fair education, as well as promoting possibilities for lifelong learning. IL enables individuals to continuously acquire knowledge, analyze information, and engage actively in promoting sustainable development (Adekoya, 2022; Hoq, 2006). The university library has been recognized as an important center in attaining these objectives. IL, which refers to the capacity to efficiently locate, assess, and utilize information has been acknowledged as an essential skill set for both individuals and organizations to actively contribute to promoting sustainable development (SD). IL is indispensable for empowering individuals and societies to make well-informed decisions, actively engage in their communities, and eventually attain goals. University libraries in Bangladesh can significantly increase IL among many

stakeholders (Islam and Tsuji, 2010). This chapter emphasizes the significance of IL. This study investigates the potential contribution of university libraries in Bangladesh towards the attainment of SDGs. It includes a comprehensive background, issue statement, objectives, research questions, hypotheses, significance, scope, and a thesis outline.

## **1.2 Background of the study**

Internationally, libraries have been widely acknowledged as crucial establishments for fostering IL and contributing significantly to SD. Libraries offer a wide range of resources, such as books, digital media, and databases, which are crucial for education, research, and making well-informed decisions (Widén *et al.*, 2021; Gao, 2021). These establishments function as central points for the community, allowing individuals to enhance their IL abilities through various programs, workshops, and training sessions.

Libraries in countries across the world have actively embraced the responsibility of promoting the SDGs by incorporating IL into their services and outreach initiatives. Public libraries frequently provide digital literacy programs that instruct individuals on accessing government services through the internet, contributing to SDGs. Academic libraries, especially in universities, play an important role in promoting IL among students and researchers (Hicks and Lloyd, 2021). They provide the necessary tools and expertise to effectively interact with academic materials, carry out research, and contribute to the knowledge-based economy.

University libraries in Bangladesh are being increasingly acknowledged as vital participants in the educational ecosystem, especially in the pursuit of the SDGs. Nevertheless, the state of IL in Bangladeshi universities is still in the process of growth and improvement. Although several colleges have initiated IL programs, there is a requirement for a more organized and planned strategy to synchronize these endeavours with the SDGs (Banik and Kumar, 2019; Islam *et al.*, 2022). Bangladesh encounters distinctive obstacles to achieve SD, such as elevated poverty rates, restricted availability of high-quality education, and susceptibility to environmental factors (Islam and Jirattikorn, 2023). University libraries may substantially tackle these difficulties by advocating for IL, enabling students, faculty members, and the wider community to actively participate in SD (Naveed and Shah 2022).

Nevertheless, there is a lack of comprehensive documentation of the present state of IL activities in university libraries in Bangladesh (Hossain and Sormunen, 2023). Consequently, it is imperative to investigate how these libraries might enhance their efforts to promote IL to accomplish the SDGs successfully.

With the intention of transforming the world by 2030 through sustainable development, the United Nations (UN) adopted seventeen goals and 169 targets on 25 September 2015. On 1 January 2016, the 17 SDGs were adopted by the world leaders at a historic UN Summit, and these were the continuation of the Millennium Development Goals (MDGs), which were commenced in 2005 (UN, 2015). While MDGs were only for developing countries, SDGs are universal and apply to all countries. Since then, different public and private organizations worldwide have kept working to align their activities with these goals. Governments must take ownership and establish national frameworks for achieving the 17 Goals (UN, 2017). Health, education, food, climate change, and other industries worldwide are working to accomplish these seventeen goals. It is one of the most goal-oriented and significant global agreements to handle the world's most squeezing difficulties, including poverty alleviation, ensuring quality education, socio-economic development, environmental protection, global stability, peace, good governance, etc., to all around the world by 2030 (IFLA 2016). Many countries are striving to achieve these goals. For example, Pandey (2019) discussed how the Indian government is working to ensure quality education for all in India in line with the SDGs goal 4, national-level implications of SDG implementation in Sri Lanka (Tilakaratna *et al.*, 2017), measuring the health-related SDGs in 188 countries (Lim *et al.*, 2016).

Like other sectors, libraries can help to achieve the SDGs by providing access and dissemination of information to community people, quality library services for education sectors and other services (Mensah, 2019). Some recent studies discussed how libraries could help to achieve SDGs, e.g., ensuring public access to information for an inclusive society and the role of public libraries (Kosciejew, 2020). Meschede and Henkel (2019) found that a large number of Library and Information Science (LIS) publications deal with the SDGs, and they are directly relevant to libraries (Bradley, 2014). In addition, libraries in many countries are working in line with SDGs, for example, university libraries in Pakistan and analysis of SDGs goal 5 (Ali, 2020); libraries as agencies for development: role of Egyptian public libraries to

achieve SDGs (Mansour, with a specific focus 2020); university libraries in Nigeria bridging digital gaps and accelerating the achievement of SDGs through ICT (Anasi *et al.*, 2018) and resetting the roles of librarians for the futuristic sustainable libraries in India (Datta and Chaudhury, 2019). UN SDGs signify a worldwide commitment to tackling some of humanity's most urgent issues, such as eliminating poverty and creating a sustainable environment. Achieving these goals requires access to accurate and timely information, making the role of LIS professionals crucial in facilitating progress toward the SDGs (Dei and Asante, 2022).

Many of the SDGs are directly related to the information industry. Historically, libraries and information centres deal with organising and managing information and knowledge. IL is a vital enabler in this regard. The term 'information literacy' was first used by Paul G. Zurkowski in 1974. Since then, it has been widely used by library and information professionals in libraries and information centres (Zurkowski, 1974). ACRL (2000) defines 'IL as the ability to recognize when information is needed and . . . locate, evaluate, and use effectively the needed information'. Secker (2018) discussed the revised definition of IL by The Chartered Institute of Library and Information Professionals (CILIP). CILIP (2012) defines "Information literacy as the ability to think critically and make balanced judgments about any information we find and use. It empowers citizens to develop informed views and engage fully with society". Many organizations like IFLA and UNESCO discuss that IL empowers people, promotes social inclusion, and works as lifelong learning. While we examine the definitions of IL, we can see that information professionals/librarians are the right people to teach these techniques to the community. This means learning how to recognize information needs, efficiently and effectively locate/retrieve information, analyze, organise, and evaluate this information, and apply information effectively to solve various problems and make decisions. Library and information professionals could help the user communities in all these areas.

To strengthen the ability of the library and information sector to advocate equitable access to information and resiliently implement the law on access to information, library and information professionals could help to achieve the SDGs. A report by The New York Times (2015) indicates that IL education is central to decreasing vulnerability goals (goals: 1,2,3,4,5,6,7,10,16) and increasing sustainability goals (goals: 8,9,11,12,13,14,15,17). In other words, through literacy education, nine goals

are aimed at decreasing vulnerability, and eight goals geared at increasing sustainability can be attained. For example, under Target 16.10, library and information professionals could ensure public access to information by preparing the IL guidelines for the community people. While the number of studies on SDGs and the role of libraries and information professionals in developed countries are substantial, very few studies have been undertaken in the context of Bangladesh. Among these are the studies done by Irfanullah (2020) and the role of libraries in SDG implementation (Mitul and Roy, 2020) found in the context of Bangladesh. However, there are newspaper articles, and the researcher found no articles on the proposed research areas.

Bangladesh, officially the People's Republic of Bangladesh, is a South Asian nation with 170 million people living in 148,460 square kilometres and an estimated Gross Domestic Product (GDP) of US\$1593.09 (Bangladesh Bureau of Statistics, 2024), characterized by a diverse cultural and economic landscape. It is the eighth most populous country in the world and one of the most densely populated countries (World Bank, 2024). The country borders Myanmar to the southeast and India to the north, west, and east. Its coastline runs along the Bay of Bengal to the south. Dhaka is the political, financial, and cultural hub, while Chittagong is the second-largest port on the Bay of Bengal. The official language is Bengali. Bangladesh forms the sovereign part of the historical and ethnolinguistic region of Bengal, which was divided during the Partition of India in 1947 and gained independence in 1971 (Frank and James, 2003). In this study, Bangladesh serves as the geographical focus, examining the specific challenges, opportunities, and cultural considerations influencing the promotion of IL in university libraries for sustainable development. Bangladesh has 55 public, 114 private, and 3 international universities (UGC, 2024). In the context of this research, university libraries in Bangladesh are the primary focus, examining their role in promoting IL to achieve SDGs. The role of university libraries refers to these institutions' functions, responsibilities, and contributions in facilitating IL and supporting the attainment of SDGs. This encompasses the library's influence on curriculum development, provision of resources, and collaborations with stakeholders to promote sustainable practices. The present study is the first of its kind in Bangladesh and attempts to analyze the role of university libraries in promoting IL to achieve the SDGs in Bangladesh.

### **1.3 Statement of the problem**

Although the significance of IL and its ability to contribute to the SDGs is widely acknowledged, there is a notable lack of studies on how university libraries in Bangladesh tackle this matter (Unegbu *et al.*, 2023). There are indications of IL initiatives in certain institutions. However, a dearth of comprehensive research investigates the present state of these initiatives, the tactics utilized, and the difficulties university libraries encounter in promoting IL. Furthermore, the connection between IL and the attainment of the SDGs in the specific context of Bangladesh has not been well investigated (Paul, 2022). This study seeks to address this deficiency by conducting a comprehensive examination of the function of university libraries in Bangladesh in advancing IL for the purpose of sustainable development.

Additionally, in the contemporary landscape of Bangladesh, marked by rapid technological advancements and the imperative pursuit of SDGs, a critical gap exists in understanding the extent to which university libraries contribute to IL and, consequently, the realization of SDGs (Rahman, 2021<sup>b</sup>). Despite the recognized importance of IL as a catalyst for informed decision-making and societal progress, the specific role of university libraries in Bangladesh in fostering IL to address the SDGs still needs to be more adequately explored.

A comprehensive study into the practices, challenges, and outcomes associated with IL programs within university libraries is necessary to formulate effective strategies for leveraging these institutions as key agents in advancing the national development agenda. Furthermore, as Bangladesh stands at the intersection of diverse socio-economic challenges, such as poverty, education disparities, and environmental concerns, the need to assess the efficacy of university libraries in addressing these issues through IL initiatives becomes paramount (Shuva, 2006).

This research aims to bridge this gap by delving into the intricate dynamics between university libraries, IL promotion, and the tangible impact of achieving SDGs in Bangladesh. By identifying the challenges, successes, and areas for improvement within this framework, the study seeks to provide valuable insights that can inform policy, practice, and scholarship, contributing to the holistic advancement of sustainable development in the country.

## 1.4 Research objectives, questions and hypotheses

### 1.4.1 Research objectives (RO)

The overall objective of this study is to explore how university libraries can promote IL to achieve the UN SDGs. The study focuses on the following specific objectives:

- RO1.* Assessing the current status of IL initiatives undertaken by the university libraries in Bangladesh;
- RO2.* Assessing the relationship between IL and SDGs;
- RO3.* Identifying the factors for promoting IL for SDGs;
- RO4.* Analyzing the perception, awareness, and satisfaction level regarding IL among university library users;
- RO5.* Identifying the impact, challenges and obstacles, additional services, and the lack of university libraries in implementing IL to achieve SDGs; and
- RO6.* Providing recommendations and best practices for the university libraries in Bangladesh to promote the IL program for achieving the SDGs.

### 1.4.2 Research questions

To achieve the objective, this study has come up with some Research Questions (RQs). This study identifies the answers to the following questions:

- RQ1.* What is the current status of IL initiatives in university libraries of Bangladesh?
- RQ2.* How does IL relate to the achievement of the UN SDGs?
- RQ3.* What strategic factors can be employed by university libraries in Bangladesh to promote IL for achieving the SDGs?
- RQ4.* What are the perceptions, levels of awareness, and satisfaction with the IL program among university library users?
- RQ5.* What impacts, challenges and obstacles do university libraries in Bangladesh face in implementing IL programs aimed to achieve the SDGs?
- RQ6.* What recommendations and the best practices can be proposed for university libraries to enhance their role in promoting IL for sustainable development?

### 1.4.3 Research hypotheses

Based on the research gaps, raised questions, and specific objectives, the study has formulated the following six hypotheses:

- H1.* There is an impact of uniform IL initiative in university libraries of Bangladesh on achieving SDGs.

- H2.* There is a relationship between promotion of IL and the progress SDGs.
- H3.* There are key factors of IL such as user engagement and skill development, digital literacy training, environmental well-being, and financial support that contribute to achieving SDGs.
- H4.* There is a relationship between the level of awareness and satisfaction regarding IL initiatives among different universities and user categories.
- H5.* There is a positive impact of IL programs on achieving SDGs.
- H6.* There are limitations such as inadequate funding, lack of awareness, and insufficient infrastructural support that hinder IL activities from attaining SDGs.

### **1.5 Research methodology**

The study adopted a quantitative research approach using two structured questionnaires. To complement the quantitative findings, responses to a few open-ended questions were subjected to thematic analysis, offering deeper insights. Additionally, a systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standard to support the study's context and theoretical foundation. The collection of quantitative data involved the use of standardized questionnaires, which were then analyzed using SPSS software. On the other hand, descriptive data obtained from respondents were analyzed thematically. The study placed high importance on ethical considerations, ensuring that participants were given informed permission and their privacy was protected. The participants comprised library administrators, staff members, and users of university libraries. The research framework encompassed a comprehensive literature review, meticulous data collection, rigorous analysis, and seamless integration of findings, in-depth discussion, and a conclusive summary.

### **1.6 Population and sampling**

To carry out the research, a total of 25 university libraries were chosen, specifically from the top 25 Bangladeshi universities evaluated by Quacquarelli Symonds (QS) Rank 2024. The QS World University Rankings is a collection of university rankings that are compiled by QS, a corporation specializing in higher education analytics (QS World University Rankings 2024). From 55 public universities, 114 private universities, and 3 international universities of Bangladesh (UGC, 2024), for this study, 25 university libraries have been chosen based on their rankings in the 2024 QS Rank list issued in Bangladesh. These include 12 public university libraries, 12 private university libraries, and one international university library.

## 1.7 Data collection technique and results mapping

Table 1.1 presents the specific research objectives (RO) and corresponding research questions (RQ) addressed in this study, along with the approaches used for data assortment, and the particular chapters where the outcomes can be found. This structured mapping confirms clearness and simplicity in connecting research areas with discoveries and investigative results.

**Table 1.1: Data collection technique and result mapping**

| RO                                                                                                                                              | RQ                                                                                                                                                      | Tools                                          | Results to be found                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Assessing the current status of IL initiatives undertaken by the university libraries in Bangladesh;                                            | What is the current status of IL initiatives in university libraries in Bangladesh?                                                                     | Printed survey questionnaire (Set 1)           | Chapters 4 and 5 (Status of IL Initiatives)                                                             |
| Assessing the relationship between IL and UN SDGs;                                                                                              | How does IL relate to the achievement of the UN SDGs?                                                                                                   | Printed survey questionnaire (Set 1)           | Chapters 4 and 5 (Relationship between IL and SDGs)                                                     |
| Identifying the factors for promoting IL for SDGs;                                                                                              | What strategic factors can be employed by university libraries in Bangladesh to promote IL for achieving the SDGs?                                      | Printed survey questionnaire (Set 1)           | Chapter 4 (Factors Influencing IL Promotion) and Chapter 6 (Recommendations)                            |
| Analyzing the perception, awareness, and satisfaction level regarding IL among university library users;                                        | What are the perceptions, levels of awareness, and satisfaction with the IL program among university library users?                                     | Printed survey questionnaire (Set 2)           | Chapter 4 (User Perception, Awareness, and Satisfaction)                                                |
| Identifying the impact, challenges and obstacles, additional services, and the lack of university libraries in implementing IL to achieve SDGs; | What impacts, challenges and obstacles do university libraries in Bangladesh face in implementing IL programs aimed to achieve the SDGs?                | Printed survey questionnaire (Set 1 and Set 2) | Chapter 4 (Impact, Challenges in Implementing IL for SDGs)                                              |
| Providing recommendations and the best practices for the university libraries in Bangladesh to promote IL program for achieving the SDGs.       | What recommendations and the best practices can be proposed for university libraries to enhance their role in promoting IL for sustainable development? | Printed survey questionnaire (Set 1 and Set 2) | Chapters 4 (Thematic result), 5 (thematic analysis) and 6 (Recommendations, Future Research Directions) |

### **1.8 Significance of the study**

This study has important implications for policy, practice, and future research. The findings can provide guidance to policymakers in developing national and institutional policies that promote the integration of IL into higher education and align library services with the SDGs. The study provides practical insights for university libraries on successful IL promotion techniques and addressing issues in this field. The guidelines offered can function as a blueprint for optimal methods, assisting libraries in augmenting their contributions to SD. The significance of this study lies in its potential to contribute valuable insights and practical implications for the intersection of IL, university libraries, and the pursuit of SDGs in the context of Bangladesh. The study's importance can be outlined as follows:

- i. **Informing policy and practice:** The findings can notify policymakers, library administrators, and educational institutions about the current state of IL programs in university libraries. This knowledge can guide the development and implementation of policies supporting IL integration with the SDGs.
- ii. **Enhancing library programs:** By identifying challenges and barriers, the study can help university libraries improve their IL programs to align with the specific goals and targets of SD. This can lead to more effective and targeted initiatives within the library setting.
- iii. **Supporting educational goals:** The study's outcomes can contribute to improving educational strategies and curricula by emphasizing the role of IL in fostering a deeper understanding of SD concepts among students and faculties.
- iv. **Empowering stakeholders:** Knowledge gained from the study can enable students, faculty members, and librarians to increase awareness of IL's importance in SD. This empowerment can lead to more active engagement and collaboration in SDG-related activities.
- v. **Addressing global development challenges:** The study focuses on the role of university libraries in achieving SDGs and addresses a critical aspect of global development. IL is a fundamental skill that can contribute to solving complex problems outlined in the SDGs when integrated into educational settings.
- vi. **Contributing to academic research:** The research can contribute to the academic literature by providing new insights into the relationship between IL and SD in a specific cultural and educational context. It can be a foundation for future research and scholarly discussions on related research areas.

- vii. **Promoting sustainable practices:** Through recommendations and best practices, the study can encourage the adoption of sustainable practices within university libraries, fostering a culture of responsible information use, resource management, and knowledge dissemination.
- viii. **Aligning with global initiatives:** As the study addresses the role of university libraries in achieving SDGs, its findings can align with and contribute to broader global initiatives aimed at promoting education, equality, environmental sustainability, and other key aspects of SD.

## **1.9 Definition of key terms**

### ***1.9.1 Information literacy (IL)***

In the context of this study, IL encompasses the skills and competencies required to access, critically analyze and apply information for academic, professional, and personal purposes within the university setting (ALA, 2015). IL is the ability to recognize when information is needed and locate, evaluate, and effective use. It has been defined by various experts, including librarians and library science professionals (ACRL, 2013).

### ***1.9.2 University libraries***

University libraries are affiliated with higher education institutions like, UGC of Bangladesh providing guidelines, resources, services, and support for teaching, learning, and research activities (UGC, 2024). The role of university libraries refers to these institutions' functions, responsibilities, and contributions in facilitating IL and supporting the attainment of SDGs.

### ***1.9.3 Sustainable development (SD)***

Sustainability is the integration of environmental preservation, social progress, and economic prosperity to meet the needs of present and future generations (UN, 2017). It aims to satisfy current needs without compromising future generations' ability to meet their own needs. The concept of SD gained widespread attention with the publication of the Brundtland Report in 1987, which defined SD as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987).” SD is an approach to growth and progress that seeks to balance economic, social, and environmental considerations to meet the needs of the present without compromising the ability of future generations to meet their own needs.

### 1.9.4 Sustainable development goals (SDGs)

SDGs, which are the successor to the Millennium Development Goals (MDGs), are a set of 17 global objectives established by the UN's 193 member states and a group of non-governmental organizations to address key challenges facing the world, including poverty, inequality, climate change, environmental degradation, peace, and justice (Council on Foreign Relations, 2017). In this study, SDGs denote the targets the UN outlined as part of the 2030 Agenda for Sustainable Development. According to the UN (2015), these goals are:

**Table 1.2: UN sustainable development goals (UN SDGs)**

| Goal No. | Goal Name                                                                                                                                                                                     |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Goal 1   | End poverty in all its forms everywhere;                                                                                                                                                      |
| Goal 2   | End hunger, achieve food security and improved nutrition, and promote sustainable agriculture;                                                                                                |
| Goal 3   | Ensure healthy lives and promote well-being for all at all ages;                                                                                                                              |
| Goal 4   | Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;                                                                                         |
| Goal 5   | Achieve gender equality and empower all women and girls;                                                                                                                                      |
| Goal 6   | Ensure availability and sustainable management of water and sanitation for all;                                                                                                               |
| Goal 7   | Ensure access to affordable, reliable, sustainable and modern energy for all;                                                                                                                 |
| Goal 8   | Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;                                                                         |
| Goal 9   | Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;                                                                         |
| Goal 10  | Reduce inequality within and among countries;                                                                                                                                                 |
| Goal 11  | Make cities and human settlements inclusive, safe, resilient and sustainable;                                                                                                                 |
| Goal 12  | Ensure sustainable consumption and production patterns;                                                                                                                                       |
| Goal 13  | Take urgent action to combat climate change and its impacts;                                                                                                                                  |
| Goal 14  | Conserve and sustainably use the oceans, seas and marine resources for sustainable development;                                                                                               |
| Goal 15  | Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss; |
| Goal 16  | Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels; and        |
| Goal 17  | Strengthen the means of implementation and revitalize the global partnership for sustainable development.                                                                                     |

### 1.10 Scope of the study

The study focuses on the intersection of IL and the SDGs in the context of university libraries in Bangladesh. It examines the current state of IL programs, their structure, and their effectiveness in empowering students and researchers. It looks at these programs' curricula, resources, methodologies, and overall structures to enhance IL among students and faculty members. The research aims to determine how these programs align with the UN SDGs and investigate how they contribute to the understanding and achievement of specific SDGs in Bangladesh. The study addresses the challenges faced by university libraries in effectively promoting IL in support of the SDGs, including infrastructure, resource, awareness, and collaboration. It evaluates how library services align with the SDGs, specifically focusing on inclusive and equitable quality education and the promotion of innovation. The research further investigates the barriers to implementing effective IL programs and explores opportunities for improvement. The study also examines the correlation between IL programs and academic success.

### 1.11 Key chapter outline in a brief

The research is organized into *six* chapters, excluding a bibliography and appendices. A schematic diagram is drawn below showing the steps for conducting the study:

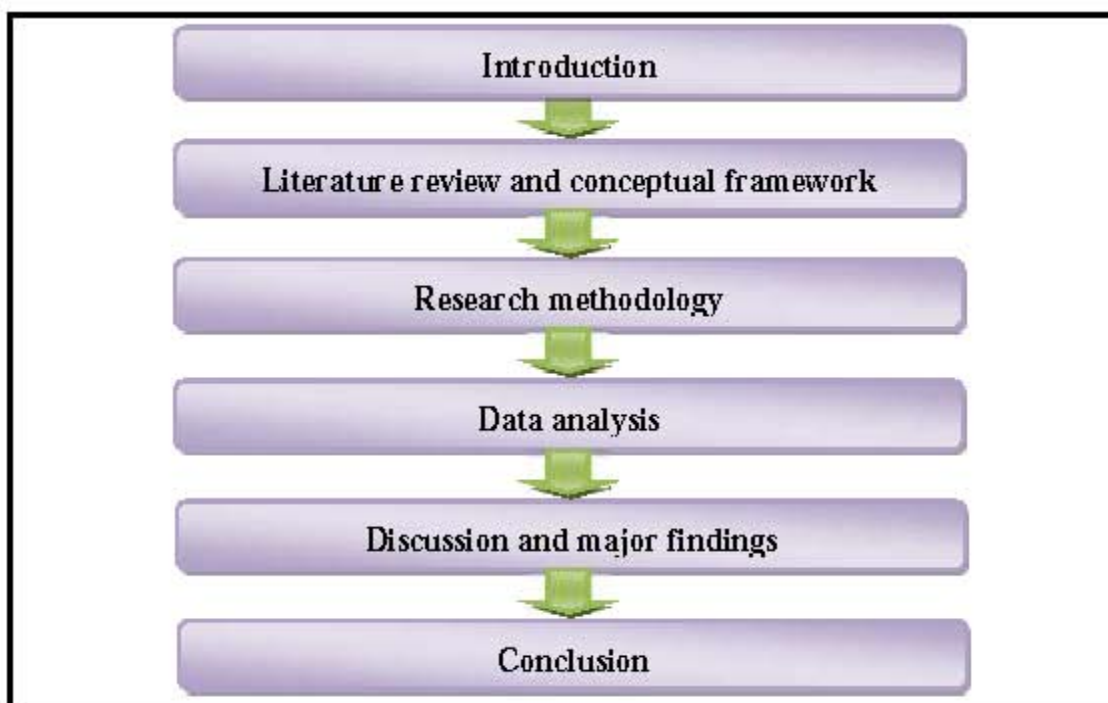


Figure 1.1: Chapter outline

## **1.12 Details chapter outline of the thesis**

The text of the dissertation has been organized in a logical progression in the *six* major chapters, including appendices and references. The chapter summary depiction is given below:

*Chapter 1 Introduction:* The introduction covers several key sections, including the background, context, and significance of the study. Next, the statement of the problem outlines the specific issue or gap that the study aims to address. The research objectives, questions, and hypotheses follow this chapter, outlining the research's goals and the questions it aims to answer. The chapter then describes the brief research methodology, explaining the approach and techniques used in the study. The population and sampling section defines the target population and the method of participant selection. Following this, the significance of the study is discussed, as well as the potential impact and relevance of the research. Finally, key terms are clarified in the definition of key terms section, and the scope of the study and chapter outlines are included in this chapter.

*Chapter 2 Literature review and conceptual framework:* The literature Review covers the scope of the literature review, adhering to PRISMA standards. The chapter explores IL by defining its concepts and importance, and examines its impact. It also discusses the role of university libraries in promoting IL and achieving SDGs, with a specific look at IL programs in Bangladesh. The review identifies barriers to IL and examines global trends in library IL programs. It also considers the opportunities, benefits, and challenges of IL and analyzes the relationship between IL and SDGs. Based on the literature review, the study identified the research gap and uniqueness of the study. Additionally, the chapter includes a theoretical and conceptual framework along with hypothesis formulation, which provides the foundational theories guiding the study and visualizes the relationship between key concepts. The hypothesis development section outlines the development of hypotheses based on the identified research gaps and theoretical perspectives. Finally, this chapter concludes with a summary that encapsulates the main points discussed.

*Chapter 3 Research methodology:* The Research Methodology chapter outlines the study's design, data collection methods, and analysis techniques. It describes the research approach, including the population, sampling strategy, and instrumentation used for data collection. The chapter also explains the statistical methods applied for

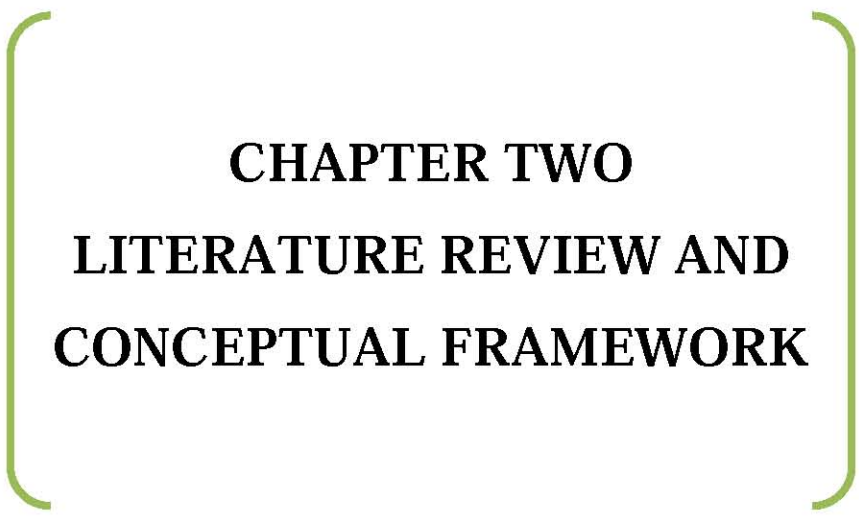
data analysis, such as Kaiser-Meyer-Olkin (KMO) and Bartlett's test for sampling adequacy, descriptive statistics, Cronbach's alpha, factor analysis, scree plot test, Mann-Whitney test, Kruskal-Wallis test, and Analysis of Variance (ANOVA), to ensure validity and reliability. Additionally, ethical considerations and research prospects of the study were discussed to provide a comprehensive understanding of the research process.

*Chapter 4 Data analysis:* The data Analysis chapter presents the findings derived from library professionals' and users' responses. It begins with an assessment of existing IL initiatives, the relationship between IL and UN SDGs, and descriptive statistics to summarize awareness levels with different IL initiatives among library professionals. Factor analysis validates the underlying structure of satisfaction variables, confirming data suitability and finding impactful factors. ANOVA tests identify significant differences in satisfaction levels among university types and user categories, providing insights into variations between library professionals and users. The study explores library users' challenges, obstacles, and perceptions of library support. The chapter analyzed the professionals' and users' insights in different aspects thematically. The results are then interpreted in relation to the research objectives, offering a comprehensive understanding of user experiences and the impact of IL initiatives on SDGs. Finally, the summary of data analysis consolidates the findings from all the objectives and hypotheses, providing an overview of the study's key insights and conclusions.

*Chapter 5 Discussion and major findings:* The discussion comprehensively interprets the analyzed data and their implications in this chapter. It begins by discussing the results in the context of the research objectives and hypotheses. The chapter examines university library professionals' and users' awareness and perception of IL, including their understanding and satisfaction with IL programs. It explores the relationship between IL initiatives and progress toward achieving the SDGs in Bangladesh. The discussion also addresses how IL facilitates knowledge sharing within academic communities and its broader societal impact. Additionally, it assesses the impact of IL on academic success, lifelong learning, and sustainable development. The chapter identifies the key factors and challenges faced by university libraries in promoting and implementing IL programs, as well as the opportunities these programs present. A

synthesis of the findings provides a cohesive understanding of the research outcomes, and the chapter concludes by justifying the research objectives, questions, and hypotheses based on the data, offering a foundation for the study's conclusions and recommendations. This chapter identifies the major findings of the study along with the challenges and opportunities of IL initiatives, including the obstacles and barriers of university libraries face in promoting IL. The challenges include limited resources, inadequate infrastructure, lack of trained personnel, and insufficient user awareness. The chapter also explores the opportunities for leveraging IL to achieve the SDGs. It highlights how promotional activities, targeted IL programs, and strategic partnerships can enhance the role of university libraries in contributing to sustainable development. By addressing both challenges and opportunities, this chapter provides a balanced view of the potential for IL to drive progress toward SDGs in Bangladesh.

*Chapter 6 Conclusion:* The conclusion chapter presents the key implications, recommendations, and conclusions of the study. It begins by outlining the implications in various domains, including academic and research contributions, institutional and policy impact, as well as broader social and economic implications. Technological implications are also discussed, emphasizing the modernization of library infrastructure, the need for enhanced cyber-security and ethical training, and expanded access to open educational resources. The chapter highlights the vital role of stakeholders, including library staff, university administrators, and policymakers, in supporting and expanding IL initiatives. It provides recommendations for future actions to strengthen IL programs, such as increased funding, staff training, and collaborative efforts. The chapter also suggests areas for further research to explore the effectiveness and evolution of IL practices. The chapter summarizes the key findings and reflections on the study's contributions to the field.



**CHAPTER TWO**  
**LITERATURE REVIEW AND**  
**CONCEPTUAL FRAMEWORK**

## **CHAPTER TWO: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK**

### **2.1 Introduction**

This chapter critically examines the existing literature related to Information Literacy (IL) and its interaction with the United Nations Sustainable Development Goals (UN SDGs), particularly within the context of university libraries. Before starting the research, it is essential to review earlier researches on IL and Sustainable Development Goal (SDG) practices conducted in university libraries and information centers. After the literature has been retrieved, a detailed analysis is required. This chapter provides an overview of IL, SDGs, and their role among university library users and professionals from various countries around the world, including Bangladesh.

### **2.2 Scope of the literature review**

The literature review aims to provide readers with a comprehensive understanding of the relevant research on the use of IL in libraries and educational settings. Manual searching and a thorough literature evaluation method are used to find the studies and discussed in this review. Thus, this section looks into the significant research on IL, how to use IL to achieve SDGs, the role of university libraries, its users' and librarians' perspectives on IL and SDGs, influencing factors, and difficulties in implementing IL in university libraries across Bangladesh and the rest of the world. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards are used to complete the literature review. The following questions are developed to conduct a literature search, taking into account the study goals: "Information Literacy" AND "Librarians' perspectives OR attitudes"; "Promoting OR Information Literacy" AND "Libraries"; "Achieving OR Sustainable Development Goals" AND "Library"; "Information Literacy" OR "Sustainable Development Goals" AND "Libraries"; "Sustainable Development Goals" OR

“Information Literacy” AND “Role of University Libraries” Scopus and Google Scholar are included into the search terms included.

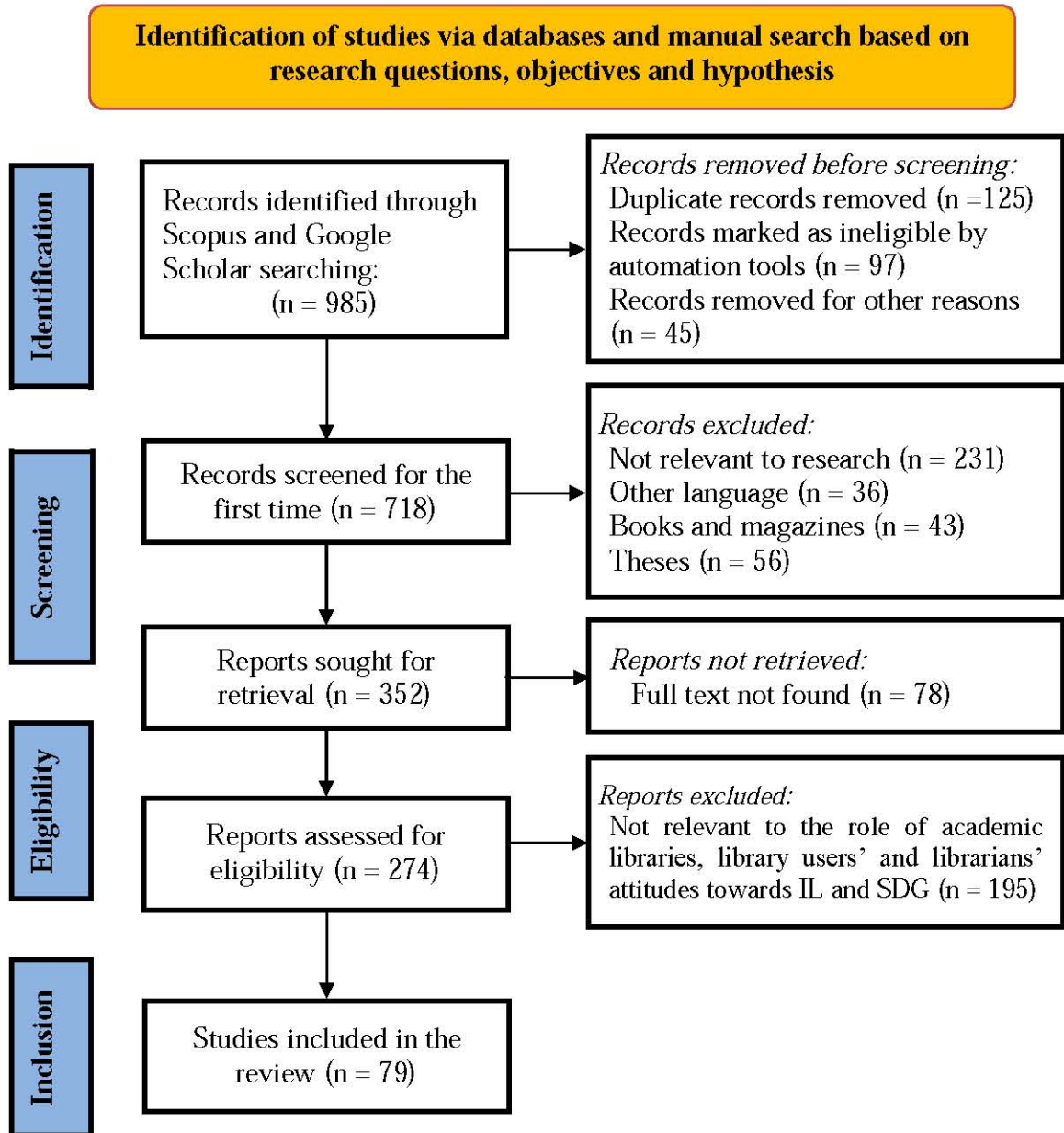


Figure 2.1: Structured literature review PRISMA diagram (Created by researcher)

The publishing years that are taken into consideration ranged from 2015 through 2024. Only English language submissions are accepted for this investigation. The relevant literature is looked for using databases such as Google Scholar and Scopus. Journal articles and conference papers and are taken into consideration. The PRISMA diagram (Figure 2.1) outlines the processes of identifying affined research, screening it, and determining the reasons for its exclusion. Following rudimentary title scanning, 718 papers are extracted, while duplicates from 985 studies eliminated. Following

completing the final screening, 79 full-text papers are included in the literature review chapter (Table 2.1). Table 2.1 presents a succinct summary of the papers that are discovered through keyword searching according to the goals and research questions. Information is also gathered manually from a few additional research works for the description which are taken from Google and are not specified in table 2.1.

**Table 2.1: Full-text documents found by keyword searching based on the research questions and objectives** (Source: PRISMA diagram, Figure 2.1)

| Focus on                                                                               | Sources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IL and its importance (26)</b>                                                      | Seifi <i>et al.</i> (2020); Aharony and Gazit (2020); Helen (2017); Yu <i>et al.</i> (2022); Mughari <i>et al.</i> (2023); Odotola and Alegbeleye (2019); Malik <i>et al.</i> (2021); Folk (2021); Nierenberg and Dahl (2021); Franklin <i>et al.</i> (2021); Safdar and Idrees (2021b); Ahmad <i>et al.</i> (2020); Vidal <i>et al.</i> (2021); Shahzad <i>et al.</i> (2021); Widén <i>et al.</i> (2021); Jan and Khan (2022); Safdar and Idrees (2021a); Aftab and Singh (2019); Naveed and Mahmood (2022); Asiedu <i>et al.</i> (2020); Jones and Procter (2023); Dorvlo (2016); Al-Azri <i>et al.</i> (2025); Guoxiang <i>et al.</i> (2023); Alagarsamy and Thirunavukkarasu (2020); Sommer <i>et al.</i> (2021) |
| <b>SDGs and their relevance to IL and libraries (19)</b>                               | (United Nations General Assembly, 2015); Hansen <i>et al.</i> (2021); Adekoya <i>et al.</i> (2024); Thorpe and Gunton (2021); (Poluru, 2020); Awodoyin and Ojo (2021); Missingham (2021); Paul (2022); Hamad and Al-Fadel (2021); Anyim (2021); Alcántara-Rubio <i>et al.</i> (2022); Connaway <i>et al.</i> (2023); Mathiasson and Jochumsen (2022); Bangani and Dube (2023); Abata-Ebire <i>et al.</i> (2018); Njoku <i>et al.</i> (2022); Islam <i>et al.</i> (2022); Rahman (2021 <sup>a</sup> ); Rahman (2021 <sup>a</sup> )                                                                                                                                                                                    |
| <b>Role of university libraries in promoting IL (6)</b>                                | Dong (2023); Gullbekk (2015); Wema (2021); Jan <i>et al.</i> (2022); Fernández-Ramos (2019); Ogunmodede <i>et al.</i> (2023)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>IL programs in Bangladesh (4)</b>                                                   | Tabassum <i>et al.</i> (2023); Hoq (2015); Banik and Kumar (2019); Hossain and Sormunen (2023)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Barriers to IL for achieving SDGs (15)</b>                                          | Adedokun (2018); Ezeani <i>et al.</i> (2017); Dei and Asante (2022); Holmes <i>et al.</i> (2022); Islam and Jirattikorn (2023); Assefa and Demissie (2019); Uzuegbu (2019); Adekoya (2022); Baba Abdulrahman <i>et al.</i> (2019); Nwankwo <i>et al.</i> (2020); Mbagwu <i>et al.</i> (2020); Mansour (2020); Bradley (2016); Kear (2018); Jain and Jibril (2017)                                                                                                                                                                                                                                                                                                                                                    |
| <b>Challenges faced by university libraries in promoting IL for achieving SDGs (9)</b> | Hicks and Lloyd (2021); Omona (2020); Unegbu <i>et al.</i> (2023); Anasi <i>et al.</i> (2018); Okuonghae and Igbinovia (2019); Rafiq <i>et al.</i> (2020); Atta-Obeng and Dadzie (2020); Mashroofa (2022); Popoola (2019)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Table 2.1 provides a structured summary of the full-text documents analyzed in the literature review, categorized according to the research focus. The largest body of literature (26 sources) explores IL and its importance, highlighting various perspectives on IL's role in education and libraries. SDGs and their relevance to IL and libraries (19 sources) include key policy documents and research on integrating IL into sustainable development (SD) frameworks. Role of university libraries in promoting IL (6 sources) emphasize their contribution to fostering IL skills. Research on IL programs in Bangladesh (4 sources) provides local insights, addressing the status and effectiveness of IL initiatives within the country. Barriers of IL for achieving SDGs (15 sources) discuss various challenges, including resource limitations, institutional constraints, and lack of awareness. Lastly, Challenges faced by university libraries in promoting IL for achieving SDGs (9 sources) cover issues such as funding, infrastructure, and policy gaps. This categorization ensures a comprehensive review of the literature, aligning with the research objectives.

According to Figure 2.1 and Table 2.1 the literature review is structured around six key concepts: *i)* information literacy and its importance, *ii)* the Sustainable Development Goals (SDGs), *iii)* the role of university libraries in promoting IL, *iv)* IL programs in Bangladesh, *v)* barriers to IL for achieving SDGs, and *vi)* the challenges faced by university libraries. These themes are explored through a review of relevant research to identify gaps in the literature that this study seeks to address.

### **2.2.1 IL and its importance**

Information Literacy (IL) is a critical competency in the digital age, enabling individuals to effectively access, evaluate, and use information. UNESCO (2013) defines IL as a set of skills that allow people to manage information and media content critically, ethically, and effectively in various formats. Theoretical frameworks and models by organizations like, CILIP (2012) are further emphasizing the ethical and critical aspects of IL; underscoring its role in helping individuals to navigate the complex information landscape.

The importance of IL in our society today cannot be undermined because it is vital for individual and societal development (American Library Association, 1998). Abell and Oxbrow (2001) focused their research on IL as an important competency that is

needed for success in knowledge-based environment. Shigwan (2014) discussed the importance of IL in lifelong learning and its role in decision-making, locating information, technology adoption, critical evaluation, research, and publishing. It emphasized the distinction between IL and information technology, highlighting the intellectual capabilities required for using technology in information education. In this regard, Seifi *et al.* (2020) aimed to examine the impact of IL skills instruction on the lifelong learning readiness of users in Iranian public libraries. The experimental group received IL skills training over one and a half months, while the control group did not. The results showed that IL instruction led to a significant increasing in readiness for self-directed learning and readiness to overcome deterrents to participation. The study suggested that public libraries in Iran should implement IL instruction to transform into lifelong learning centres.

Aharony and Gazit (2020) explored the extent to which variables such as openness to experience, cognitive appraisals of threat and challenge, and motivational explanation of students' self-efficacy to IL program. The research findings suggest that the variables of openness to experience, threat and challenge, and motivation significantly contribute to students' self-efficacy IL. The study provides insights into how students perceive their ability to handle and evaluate information found on the internet and how certain factors influence their self-efficacy in this regard. The findings may lead to further inquiry in the field of IL and contribute to developing strategies to enhance students' IL skills.

Helen (2017) focused on her work entitled "Measuring Information Literacy Competency of Public University Students in Bangladesh," where she found that students had limited skills in IL. The IL competency of the students needs to be in a better position, while a low level of competency, insufficient facilities, and negligence from the department and university authorities hindering IL programs. In this paper, researcher assesses the IL competencies and proficiencies of selected public university students in Bangladesh, identifying their strengths and weaknesses. The study provides insights into students' knowledge about IL and IL education, emphasizing the need for expertizing in access to information and recognizing when information is needed. The study found that the IL competency of selected public university students is better. Proper monitoring processes are identified as a

significant problem in developing IL skills among students. The researcher used a questionnaire to measure the IL competency of the students. The findings of this study show how low the IL competency level of the students is. The study highlighted the need for Information and Communication Technology (ICT) based facilities in public universities as a long-standing problem that hinders students' development of IL skills.

Yu *et al.* (2022) focused on smart classrooms, where physical classrooms are integrated with technologies to enhance students' learning experiences. Using the purposive sampling method, the study utilized a quantitative method to investigate the IL and preferences for smart classroom learning environments (PSCLE) of 873 Chinese college students. This study explores the relationship between students' IL and their preferences for smart classroom and learning environment. The article utilizes a quantitative method to investigate Chinese college students' IL and PSCLE. The findings of the study can provide insights for researchers and education practitioners to design student-centred smart classroom and learning environment based on students' IL levels. The work is also hypothesized and validated the positive relationship among students' level of IL and their level of preference toward functional design and multiple sources in the smart classroom. The study emphasized the importance of evaluating students' IL and equipping smart classrooms with various information and communication technology devices to cater to students' varying levels of IL.

Mughari *et al.* (2023) investigated the effect of IL on the academic performance of business students in Pakistan, specifically in urban Sindh. The research approach used in this study is a quantitative cross-sectional survey, collecting data from 385 business students enrolled in different degree programs. The study aims to fill this gap by investigating the effect of IL on the academic performance of business students in Pakistan. The results were showed that business students in Pakistan are information literate and that IL positively predicts their academic performance. This study contributes to the existing literature on the effectiveness of IL in academia, particularly for business students in the South-Asian region. Odutola and Alegbeleye (2019) explored the relationship between environmental factors, IL skills, and information resources used by prison inmates in North-Central Nigeria. The findings were revealed that environmental factors and IL skills were correlated positively with

information resources used by prison inmates, while environmental factors were being the most potent predictor. The study found a positive correlation between environmental factors and IL skills with information resources used by prison inmates. Environmental factors and IL skills combined accounted for 51% of the variance in the prediction of information resources used by prison inmates.

Malik *et al.* (2021) assessed the IL skills of mathematics faculty members in higher education institutes in Pakistan. The study found that the faculty members had reasonable IL skills at the basic level, including identifying information needs and sources, planning strategies to locate; access; evaluate information, and present information legally and ethically. However, they were less competent at the advanced level of IL skills. The study suggested the need for information professionals/librarians to design IL programs tailored to the requirement of faculty members.

Folk (2021) shared the findings of a qualitative research study that explored first-generation college students' experiences with research assignments, highlighting factors that enable or constrain the development of undergraduate students' IL within the postsecondary academic context. This study aims to understand the factors that facilitate or curb the growth of undergraduate students' IL through qualitative research on first-generation college students' experiences with research assignments throughout college. This study emphasized the sociocultural nature of IL and the importance of understanding the discursive practices privileged in academic or specific disciplinary cultures. It identifies IL as a critical component of these practices. The researcher presents a working conceptual framework based on the concept of communities of practice to explore the development of undergraduate students' IL. This framework provides a theoretical lens for understanding the factors influencing IL development.

Nierenberg and Dahl (2021) examined the IL ability and meta-cognition of students in higher education. The study shows that men tend to estimate higher and more accurate scores than women, and PhD students show greater interest in becoming information literate compared to undergraduates. Interest in becoming information literate correlates more strongly with the effort invested in developing IL competencies than the perceived need to know more. The paper raises concerns about individuals' ability

to evaluate the quality of information sources and use them appropriately, as evidenced by disquieting findings from recent research. The study also highlighted the importance of accurate self-assessment in IL research.

Franklin *et al.* (2021) described the development and implementation of an interactive online IL tutorial for first-year undergraduate students. The tutorial used the backward design and predictable understandings and misunderstandings frameworks. It includes obtaining grant, selecting authoring software, scriptwriting, and conducting usability testing. The paper describes the impetus and process for developing a new library research tutorial for first-year undergraduate students, including obtaining grant funding, selecting authoring software, scriptwriting, and conducting usability testing. The authors provided preliminary data on students' performance on the tutorial modules and discuss lessons learned in redesigning the tutorial.

Safdar and Idrees (2021<sup>b</sup>) explored faculty opinions on students' IL skills and their value and identified differences in IL skills among students of different programs. Faculty considered IL skills necessary, and students differed significantly in their responses to IL skill statements. The researchers interviewed faculties to explore their perceptions on students' IL skills, including identifying main ideas, managing information, and using different sources and formats. Faculty believed students lacked skills in identifying main ideas and managing information but were good at using various sources and formats. Ahmad *et al.* (2020) explored the relationship between CEOs' IL and innovation in small and medium-sized enterprises (SMEs) in Finland, finding that IL positively impacts the development of exploratory and exploitative innovations in SMEs. The study revealed that CEOs' IL positively impacts the development of exploratory and exploitative innovations, with opportunity recognition mediating this relationship.

Vidal *et al.* (2021) proposed a framework for initiating students in the skills of accessing information effectively and efficiently based on the IL competency standards for higher education. The framework was implemented in four professional careers at a public university, and initial results were showed that students perceived a state of maturity after the experience. The authors believed that the approach presented can be adapted to different contexts and specialties. The framework can

also be adapted to different contexts and specialties, making it applicable in various educational settings. The study highlighted the need for systematic measurement of learning achievements related to IL, and future work aims to expand the number of hours dedicated to information search activities and develop quantitative measurement instruments.

Shahzad *et al.* (2021) examined the satisfaction level of engineering students in Islamabad, Pakistan, with their IL skills and the perceived importance of IL programs. The research involved undergraduate and postgraduate students from engineering universities in Pakistan, with data collected through a structured questionnaire. The findings were indicated that engineering students had an average level of IL skills, with no significant mean difference based on gender. The participants graded IL programs as necessary to strengthen their IL skills and expressed a need for structured and focused IL programs.

Widén *et al.* (2021) explored the relationship between IL and social capital in the workplace, finding that IL supports all three dimensions of social capital. The paper fills a research gap by conducting a quantitative study that explores the relationship between IL and social capital in the workplace. The findings contribute to a better understanding of managing human resources, information and knowledge processes in organizations. The study also highlighted the potential for future research to understand further this relationship, such as exploring the connection between IL, socio-capital, and profitability of companies and examining differences between specific sectors and branches. Jan and Khan (2022) assessed the IL skills of faculties in public-sector medical colleges in Khyber Pakhtunkhwa, Pakistan. In this research, researchers are utilized a quantitative approach and a survey to gather data on faculties' IL skills. The study emphasized the need for a comprehensive IL program supported by research scholars and the development of stand-alone IL courses in the curriculum to improve the skills of faculties and students.

Safdar and Idrees (2021<sup>a</sup>) highlighted the need for an IL program to improve students' IL skills and to meet their research and academic needs. The findings of the study had practical implications for educational institutions in Pakistan and other developing countries, as the results can be used to design and implement IL courses. The study

assessed the IL skills of undergraduate and postgraduate students in a premier university in Pakistan, finding that the majority lacked these skills. However, the students recognized the value of an IL program to meet their research and academic needs. The study recommended the implementation of an IL course in educational institutions to improve students' skills and performance, which could contribute to the reputation and success of both the students and their institutions.

Aftab and Singh (2019) explored the IL skills among the users in the Faculty of Social Sciences at Jawaharlal Nehru University (JNU) and the University of Delhi (DU) through a survey method. It focused on recognizing the users' needs of information, awareness about different information sources, searching skills, problems in accessing library resources, and level of satisfaction with IL programs at that time. The study revealed that a significant number of users in both universities were lacking awareness and utilization of different information sources, had inadequate searching skills, and encountered problems in accessing library resources. The paper concluded with suggestions to improve the IL skills of the users in JNU and DU.

Naveed and Mahmood (2022) investigated the correlatives of IL self-efficacy among business students at the University of Management and Technology, Lahore. The study utilized a cross-sectional survey with 350 students and found that the students had high self-efficacy for basic IL skills but low self-efficacy for advanced-level IL skills. Age, study program, study stage, computer proficiency, and English language correlate with students' IL self-efficacy. Asiedu *et al.* (2020) assessed the IL skills of undergraduate students in a multi-campus university in Ghana, specifically focusing on their understanding of plagiarism and the need to evaluate information before using it. The findings revealed that most students were aware of plagiarism, its implications, and the importance of evaluating information. The study recommended introducing IL programs in higher learning institutions and integrating them into the academic curriculum. Researchers were also addressed the objective of testing the knowledge level of students on "Library literacy," including their understanding of how materials are arranged on library shelves. It emphasized the significance of IL in higher education institutions for attaining lifelong learning.

Jones and Procter (2023) discussed the need to develop young people's digital, media, and information literacies, highlighting the lack of agreement on what constitutes a basic literacy level across countries. The paper maps the elements of the Global Competence Survey against the EU Digital Competence Framework, providing a comprehensive understanding of the different aspects of digital, media, and information literacies. The findings suggested that digital literacy education should go beyond operational ICT skills and focused on helping students understand how and why digital tools are used by others and how to apply these skills effectively in various contexts. Researchers also highlighted the importance of addressing issues such as online safety, access to information critical awareness of sources, and ethical awareness in digital literacy education.

Dorvlo (2016) investigated the IL levels among postgraduate students at the University of Ghana, focusing on concept identification, search strategies, search tools, evaluation of information, legal and ethical use. It found that while most students could identify concepts, they needed to gain skills in search strategies, search tools, and evaluation of information. The majority of postgraduate students were required to be more information literate. The study recommended introducing IL education as an entire credit-bearing course in the university's curriculum, integrating it into the research method course, and employing more library professionals to teach it effectively. The study aimed to motivate other universities to include IL in their curricula by highlighting the importance of ethical and legal use of information, such as citing and referencing, to prevent plagiarism. The study found that most postgraduate students at the University of Ghana lack IL skills, particularly in search strategies, search tools, and evaluation of information. The paper also emphasized the need for practical sections in the IL course and theoretical components to make it more effective. It suggested equipping the library with training rooms filled with computers for practical sessions.

Al-Azri *et al.* (2025) focused on the experience of IL in the workplace and using academically based IL frameworks to enhance workplace performance. The review highlighted the limited availability of frameworks tailored to specific workplaces and the significant differences between academic and workplace IL. The study emphasized the positive role of IL in improving work performance and suggested the

need for further research to develop workplace-specific IL frameworks. The paper highlighted the need to bridge the gap between academic and workplace IL to ensure employees have the necessary skills to navigate and utilize information effectively in their work contexts.

Guoxiang *et al.* (2023) examined the impact of IL on the creativity of foreign language faculties in Chinese universities, specifically focusing on information, knowledge, awareness, ability, and morality. In this work, researchers collected data from 205 foreign language faculties and used descriptive statistics, validity and reliability tests, correlation analysis, and regression analysis to verify the hypothesis. The paper explored the relationship between IL and the creativity of foreign language faculties in Chinese universities, specifically focusing on information, knowledge, awareness, ability, and morality. The results indicated that IL significantly impacts creativity, with information, knowledge, awareness, and ability showing varying degrees of positive impact.

Alagarsamy and Thirunavukkarasu (2020) assessed the IL skills of research scholars at Alagappa University, Karaikudi, India. They found that a significant percentage of respondents used electronic resources for project work, e-journals, and daily information needs. The study also revealed that respondents utilized search engines, simple vital functions, and copy/paste functions for online information retrieval. Additionally, the study highlighted the need for the department to implement an IL program to enhance the skills of research scholars. The paper also emphasized the importance of digital literacy skills for graduates to become part of the knowledge society and suggests imparting these skills to every graduate. The paper concluded that IL skills are crucial for research scholars to utilize electronic resources effectively, and there is a need for educational institutions to provide training and support in this area.

Sommer *et al.* (2021) investigated the validity of the evidence of the Information Literacy Self-Efficacy Scale (ILSES) among undergraduate students. The study found that the ILSES demonstrated good validity evidence among undergraduate students, indicating its effectiveness in measuring students' self-efficacy in IL. The authors identified four retained factors in the ILSES model that align with the essential

aspects of IL, including recognizing information needs, locating and evaluating information, and effectively using needed information. The study also acknowledges the challenges in IL assessment, including the rapid changes in the information landscape and the limited availability of validated assessments for learning purposes.

### **2.2.2 SDGs and their relevance to IL and libraries**

The (SDGs are a global initiative launched by the United Nations in 2015 to address pressing social, economic, and environmental challenges by 2030. These goals emphasize the importance of education, information access, and knowledge dissemination, with specific goals like SDGs goal-4 (Quality Education) and SDGs' goal-16 (Peace, Justice, and Strong Institutions) directly relating to IL (United Nations General Assembly, 2015).

Scherer (2014) defined a sustainable library as: 'A library built to have the most possible good effects on the community's social, cultural, economic, and environmental elements'. Cheever (2013) discussed sustainability as a method of economic planning that aims to maintain environmental quality for future generations while promoting economic progress. In terms of sustainability in librarianship, the idea of sustainable libraries has grown in acceptance as a component of library practices and operations. Online Dictionary of Library and Information Science (ODLIS, n.d.) discussed green or sustainable libraries employ natural building materials, biodegradable goods, and careful site selection to limit their negative effects on the environment and increase the quality of the inside environment.

Hansen *et al.* (2021) concentrated on how the university started incorporating SDGs at the undergraduate level through initiatives like the Global Citizens Project, which labels events and courses with SDGs. Since their widespread adoption in 2015, the UN SDGs have presented obstacles for institutions of higher learning, including a lack of resources and disjointed programs that highlight the goals. The Times Higher Education University Impact Rankings and institutional adjustments created more avenues for broader discussions about the SDGs throughout the university. This study recommends matching an institution's fundamental principles of high-quality

education, collaboration, and a healthy, sustainable society to overcome obstacles and increase SDG engagement.

Adekoya *et al.* (2024) investigated how academic libraries help achieve sustainable higher education development (SHED) in university libraries in Nigeria. Data were collected from 607 public university librarians using a questionnaire. The authors found that the role of academic libraries in achieving SDGs was essential, and being used ICTs in academic libraries helps accomplish SHED in Nigeria. Thorpe and Gunton (2021) identified in their work entitled “Assessing the United Nation’s Sustainable Development Goals in academic libraries”, Australian academic libraries were documenting and planning their contribution to the United Nations’ 2030 agenda for Sustainable Development (SD), were identifying assessment frameworks and key performance indicators. In 2019, the University of Southern Queensland (USQ) Library conducted a case study to understand how their daily work and annual planning targets align with the SDGs. The authors discussed the process of mapping the community and aligning an academic library’s initiatives with the SDGs. They highlighted the Australian library community’s 2030 stretch objectives and the USQ’ library staffs were discovered that eight of the seventeen SDGs were linked to current services, collections, and initiatives. The focus was on identifying significant projects or activities closely related to SDGs. The university’s top management was informed about activities mapped to eight SDGs, raising awareness among library employees about their work’s cultural and socioeconomic implications. The process prompted discussions about the library’s role in enhancing information access and its potential to impact students and the community. The SDGs can serve as a challenge and benchmarking tool for university libraries.

UN SDGs were approved in 2015 to protect the environment and improve living conditions. Achieving these goals by 2030 requires collaboration between the public, business, academic, and civil society sectors. The UN 2030 Agenda includes universal literacy, ICT access, cultural heritage, and information access. In this study, researcher highlights the involvement of library associations and libraries worldwide, which are crucial in supporting organizations and institutes working towards achieving the SDGs. The Knowledge Management Centre/Resource Centre of the National Institute of Design, Ahmedabad, plans to develop an archive for the

institute's SDG work, highlighting the importance of individual participation in transforming the world (Poluru, 2020). Awodoyin and Ojo (2021) investigated librarians' awareness and perception of SDGs' attainment in Nigeria, finding that librarians were highly aware of twelve out of the seventeen goals. They also perceived that SDGs enhance human development and that an SDG corner should be available in the library. However, the main factor limiting the contribution of librarians to SDG attainment was identified as a high level of corruption and misappropriation of funds. The study concludes that librarians need to increase their knowledge and positively perceive SDGs and recommends attending conferences and workshops related to SDGs. The researchers suggested that library management motivate library staff to attend training on SDGs, provide them with important information on SDGs, and create avenues for librarians to enlighten library users on the importance of SDGs and their role in their attainment. Researchers also suggested that libraries should associate with NGOs supporting SDGs to influence and create government policies.

Missingham (2021) discussed the importance of assessing academic libraries using the UN SDGs and emphasized the value of global perspectives in the information infrastructure. The paper utilizes a meta-level assessment approach to evaluate the value of academic libraries, specifically focusing on the lens of the UN SDGs. The researcher analyzed the contribution of academic libraries to national and international development and education by applying the UN SDGs framework. The author highlighted the role of academic libraries in supporting the SDGs through activities such as communicating knowledge, building partnerships, and fostering innovation in service and education.

Paul (2022) analyzed the relevance of social service programs in Bangladesh in achieving the SDGs and the challenges faced in implementing these goals. The programs were not appropriately designed in line with the SDGs, and encountered challenges such as identifying beneficiaries, limited coverage, and leakage of funds. The study emphasized the need to design programs focusing on the targets of the SDGs and suggests involving social service experts and graduating social workers in the process. The findings aimed to assist policymakers and social service agencies in introducing or redesigning programs consistent with Agenda 2030.

Hamad and Al-Fadel (2021) found that academic libraries can significantly contribute to these goals by providing access to relevant information and training on IL. Researchers recommended that academic libraries contribute to every SDG. The study also suggested strategies like collaboration with government and health institutions to improve the quality of life in society. Anyim (2021) examined the advent of brilliant classrooms, which enhance teaching efficiency, promote active learning, and improve pedagogy and student outcomes. The researcher emphasized that quality education was crucial for SD and achieving the UN SDGs. It influenced attitudes, critical thinking, and informed decision-making. To achieve these goals, teaching pedagogy and learning resources must be improved. Universities in Nigeria were embracing an educational revolution, incorporating 21<sup>st</sup> century facilities, learning resources, and improved pedagogy to train students for societal and global impact.

Alcántara-Rubio *et al.* (2022) analyzed the incorporation of the SDGs in higher education institutions (HEIs) by reviewing scientific evidence published between 2015-2020. Researchers identified a global approach to the SDGs, with SDGs goal 4 (Quality Education) being the most frequently referenced, and highlight the integration of the SDGs in the curricular schedule as the most frequent action in the university context. The study findings can inform universities and policymakers about the areas where more attentions and actions were needed, such as integrating the SDGs into the curricular schedule and focusing on research and education. Connaway *et al.* (2023) conducted a survey over 1700 library staff worldwide reveal that libraries contribute to five UN SDGs. Both academic and public libraries are being engaged in substantial work around these goals, sometimes through strategic planning or programming. Although most respondents have not incorporated these goals into their strategic planning, their support can inform strategic planning and maximize library impact on SD.

Mathiasson and Jochumsen (2022) reviewed 102 research publications on libraries' role in sustainability and SD, including the UN SDGs in their work entitled "Libraries, sustainability and sustainable development: a review of the research literature." The review used the hermeneutic literature review method, categorizing publications into environmental, economic, social, cultural, and holistic categories. The study focused on the idea that libraries and librarians should be resourceful, explicit about their

motivations, and act as change agents to address global sustainability challenges. This review provided valuable insights for future research and discussion.

Bangani and Dube (2023) explored how academic libraries in South Africa can contribute to SDGs goal no 2, 3, and 13 through their Community Engagement (CE) initiatives. The study found that academic libraries in South Africa play a vital role in addressing hunger, improving health and well-being, and contributing to climate action, among other SDGs, through their CE initiatives. It recommends that academic libraries consider mapping their CE initiatives against the SDGs. The study suggested that academic libraries map their CE initiatives against the SDGs, encouraging them to participate in development areas that they do not traditionally contribute directly. Academic libraries contributed to SDGs goal 2 (No to Hunger) by addressing food insecurity, SDGs goal 3 (Health and Well-being) through health IL and awareness activities, and SDG 13 (Climate Action) through recycling, tree planting, and environmental literacy programs. These initiatives are mutually beneficial to the libraries and communities. The study recommended that academic libraries consider participating in CE initiatives to contribute to development areas beyond their traditional roles and suggests mapping CE initiatives against the SDGs. Libraries can use the SDGs as a framework to contribute to the communities' needs, such as hunger, health, well-being, and climate justice. Library bodies can organize SDG awareness workshops, commission studies to audit CE activities, create platforms for sharing initiatives, and communicate the results widely to secure more funding and demonstrate impact.

Ochogwu (2009) stressed the necessity of understanding how information and knowledge are related to SD, as this relationship serve as the cornerstone of national development in the information era. Planning, decision-making, and policy development may all benefit from the appropriate use of information. Abata-Ebire *et al.* (2018) emphasized the role of libraries in achieving SDGs, highlighting the need for libraries to provide relevant and accessible information to the public. The paper acknowledged that libraries play a crucial role in achieving SDGs by providing relevant and accessible information to the public. Libraries and information centres are important institutions which serve as channels to knowledge, providing IL skills, lifelong learning, and individual research and learning development. Libraries can

contribute to SD by educating people on managing forests, land, and ecosystems and providing access to climate change information and preservation techniques for oceans and marine resources. Researchers recommended organizing seminars, integrating libraries into government activities, and providing financial support to libraries and information centers.

Njoku *et al.* (2022) emphasized the need for academic libraries to extend their services to remote areas and attract users to promote community literacy programs and support sustainable educational development goals. The study concluded that community literacy programs create knowledge on new skills, strengthen access to diverse information, and bring together different information-seeking interests to improve human knowledge in society. In this paper researchers highlighted the importance of literacy for SD, the role of academic libraries in promoting literacy, the need for interactive approaches, and the significance of government support in achieving these goals.

Islam *et al.* (2022) investigated public librarians' awareness about UN SDGs in Bangladesh and their perceived role in achieving SDGs through public libraries. Researchers highlighted that while public librarians are generally aware of SDGs, challenges like, lack of activities, awareness, funds, and implementation plans hinder the adoption of SDGs in public libraries. Public librarians in Bangladesh showed varying levels of awareness and understanding of UN SDGs, with most responses aligning well with SDGs goal 1, 2, 3, 4, and 17. Out of the 17 SDGs, public libraries were found to be working effectively on 7 goals, such as quality education (Goal 4) and zero hunger (Goal 2). The study highlighted the need for more diverse research in the field of public libraries to enhance their support for SDGs and contribute to SD efforts. The research serves as a basis for further in-depth studies to enhance public library services in alignment with SDGs, aiming to contribute to the overall progress towards SD.

Rahman (2021<sup>a</sup>) analyzed the allocation of business and progress towards the SDGs in Bangladesh, finding that public sectors were being towards achieving 111 out of 169 targets. Still, full attainment was required for significant progress. The researcher identifies that most targets have only been partially achieved, and further efforts were

needed for full attainment. Different ministries and divisions have varying performance levels when allocating SDG business. The research suggested conducting further in-depth analysis of each organization separately to understand their roles and responsibilities in achieving the SDGs. The paper provided an understanding of the current standings and challenges faced by public organizations in Bangladesh in achieving the SDGs. It critically reviewed the allocation of business of 59 organizations to identify their roles, responsibilities, and constraints in achieving the SDGs. The paper suggested that coordination and integration among stakeholders, including policymakers, society, NGOs, and private sectors, were crucial for successful SDG implementation in Bangladesh. It also mentioned the importance of the 10-Year Framework of Programmes (10YFP) in supporting sustainable consumption and production patterns in both developed and developing countries.

Rahman (2021<sup>b</sup>) assessed the performance of achieving the SDGs targets in Bangladesh and identified institutional challenges in their implementation. It highlighted the need to revise stakeholder analysis, address jurisdictional overlapping and conflicts of interest, improving competency and accountability to achieve SDGs effectively. The study contributed to understanding the internal factors affecting SDG implementation in Bangladesh and provided insights for policymakers, civil societies, donor agencies, academics, researchers, environmentalists, and NGOs. Despite challenges, Bangladesh has made progress in achieving Millennium Development Goals (MDGs) and is better positioned than some South Asian countries in terms of SDGs. The paper identified institutional challenges in achieving the targets of SDGs in Bangladesh, including overlapping jurisdiction, conflicts of interest, and lack of cohesion. It highlighted the need to revise stakeholder analysis, improve competency and accountability, and adopt a more inclusive and bottom-up approach to policy formulation. The study emphasized the importance of accurate mapping, data availability, and stakeholder involvement to ensure effective monitoring, evaluation, and reporting of SDG progress. The paper also suggested that addressing the identified institutional weaknesses and reallocating business for ministries and divisions can enhance the country's ability to achieve SDGs effectively. The 17 SDGs with 169 targets and the potential role of university libraries' contribution to the achievement of SDGs is a challenging issue. While public libraries are facing lots of challenges, they have to emerge with a real plan and proposals, a framework to work

and turn challenges into opportunities. Here the researcher also revealed that university libraries were generally aware of UN SDGs. The perceived understanding on the role of university libraries to achieve SDGs varies from SDGs goal 1 to SDGs goal 17. However most of the librarians responses ranked well in line with SDGs goal 1, 2, 3, 4, and 17, and they believed that their public libraries are doing well on some of these goals. It is provoking that out of 17 SDGs, university libraries are working well on 7 goals which was said earlier.

From this section it is clear that all SDGs are not equally perceived by the librarians and some of those goals are ranked well where university libraries can work well to achieve SDGs. Public librarians believe that nourishing early literacy, IL, adult literacy, learning reading materials and other educational programs organized by university libraries can help to achieve goals. The university librarians believe that libraries can collaborate and work in a partnership with other organizations to carry out the community awareness camping goals.

### **2.2.3 Role of university libraries in promoting IL**

University libraries serve as hubs of knowledge and information, offering a range of resources and services to support teaching, learning, and research. They have the potential to become crucial engines of transformation towards SD. University libraries can provide a rich collection of resources, including books, journals, research papers, and online databases, all of which can contribute to addressing the information needs of students, faculty, and researchers involved in SDG-related projects. Libraries are providing their patrons with the tools they need to effectively contribute to SD projects by improving their IL. Libraries can collaborate with relevant stakeholders, including faculty, researchers, and community organizations, to develop comprehensive programs and initiatives promoting IL and the integration of SDGs into research and academic activities.

Dong (2023) analyzed the representative universities' general literacy education practice and conducted user interviews to construct the IL education model. The model included a multi-staged IL education system and a beyond IL education curriculum system. The study also explored users' viewpoints on IL knowledge,

learning motivation, the organization model of IL education, and the influencing factors of the effect of IL education. The paper concluded that under the open science environment, beyond IL education, it is essential for university libraries to integrate IL education into the entire scientific research process.

Gullbekk (2015) explored the expectations placed on librarians involved in interdisciplinary courses in higher education, linking interdisciplinary courses with IL. The paper provided a conceptual analysis that informs academic libraries about alternative paths in developing or revising activities for multidisciplinary education. It presented four cases highlighting different professional competencies required for interdisciplinary education, ranging from technical skills in multidisciplinary settings to collaborative problem-solving in interdisciplinary fields. The analysis provided insights into the competencies needed for librarians engaged in multidisciplinary courses, emphasizing the importance of integrating disciplinary components and addressing research problems in interdisciplinary settings. This study also offered a framework for future research problems that address the current challenges related to IL in multidisciplinary settings.

Al-Issa (2013) found that students needed a more cohesive understanding of IL and held different meanings for it. The qualitative study explored the experiences of undergraduate students in Kuwait to understand how they did develop their understanding and valuing of IL and its standards. The researcher articulated specific aspects of IL and highlights influences on developing IL skills. The study suggested further research on larger populations to assess student levels and understanding of IL to design effective instruction. The thesis highlighted specific aspects of IL articulated by the students, such as the information process, influences on developing IL skills, and expectations. The study also examined the development and practice of IL in Kuwait and other Gulf Cooperation Council countries, providing insights into its impact on education and curriculum in Library and Information Science education.

Wema (2021) discussed the challenges Tanzanian institutions face in introducing web-based teaching of IL and the need to overcome these challenges to implement virtual learning environments (VLEs) effectively. The paper reviewed the potential and challenges of introducing VLEs in Tanzania, emphasizing their applications in

teaching IL courses to library users. It highlighted the success of using VLEs in facilitating the teaching of IL courses and the need for Tanzanian institutions to develop VLEs to reach students and faculty who cannot attend face-to-face sessions. VLEs had been used to support the teaching of IL at various education levels worldwide. Still, there was a need to understand how VLEs can be effectively employed in Tanzanian universities to teach IL. Previous research had highlighted the gaps in teaching IL courses in Tanzanian universities, calling for appropriate mechanisms to reach large student populations. This article aimed to highlight efforts made by higher learning institutions globally to teach IL in VLEs and encourage Tanzanian universities to adopt similar approaches.

Jan *et al.* (2022) evaluated the IL skills of faculties in public-sector medical colleges in Khyber Pakhtunkhwa, Pakistan. The study found that faculties in public sector medical colleges in Khyber Pakhtunkhwa have varying IL skills. The survey results revealed that faculties cannot determine the nature and extent of desirable information and must be fully aware of different sources of needed information. The study also identified that faculties used various tools to locate and accessed multiple sources of information. Still, their skills needed to be improved to evaluate the collected information. The level of presenting the collected information was moderate among the respondents, indicating room for improvement in this area. The study highlighted the need to enhance IL among faculties in public sector medical colleges in Khyber Pakhtunkhwa to ensure they can effectively access, evaluate, and present information in their professional practice.

Fernández-Ramos (2019) analyzed the implementation levels and challenges of online IL instruction in Mexican university libraries, highlighting a limited development and barriers such as lack of technological resources and qualified personnel. The findings emphasized the importance of addressing those barriers and the need for institutional support and collaboration with faculties. The paper emphasized proper planning, design, and allocating sufficient time, knowledge, and resources for effective online instruction. It also highlighted the importance of cooperation between libraries and consultation of scientific literature to address the difficulties associated with online training programs. The researcher recommended that Mexican university libraries should share and disseminate their experiences of online IL instruction with other

libraries to improve their programs. It also suggested further research to analyze the relationship between IL instruction and its factors such as student characteristics, librarian backgrounds, budget, curricula, etc.

Ogunmodede *et al.* (2023) focused on the study, stated that the library serves as the nucleus of development and was crucial to achieving SD objectives, as information drives growth and sets industrialized economies apart from developing ones. Libraries and information centers had faced challenges such as inadequate infrastructure, low bandwidth, and poor welfare for personnel. Still, they play a crucial role in providing equitable access to information and satisfying the information needs of society. The paper discussed the challenges faced by libraries and librarians, such as inadequate infrastructure and low bandwidth, in fulfilling their role in SD. The research also highlighted the role of libraries in bridging the digital gap, providing support for society members embracing the digital world and managing both print and digital resources.

#### **2.2.4 IL programs in Bangladesh**

IL programs in Bangladesh have been progressively developed to address the growing need for media and IL, particularly in the digital age. These initiatives are focusing to enhance the capacity of various groups, including students, educators, and marginalized communities, to access, evaluate, and use information effectively.

Tabassum *et al.* (2023) identified the media and information literacy (MIL) and its self-efficacy level of LIS students in Bangladesh and the influence of demographics. Data were collected from universities using a convenience sampling technique. The results showed that LIS students in Bangladesh rated their MIL level as moderate, but were confident in accessing relevant resources using different media. Graduate students and faculties were more knowledgeable than undergraduate students. However, their MIL level was less in creation than other dimensions like access, evaluation, use, and understanding. The research found significant differences between students' demographics and their MIL level. That was the first attempt in Bangladesh to analyze LIS students' level of MIL self-efficacy. This article also discussed Bangladeshi library professionals' initiatives and challenges in promoting

media and IL in Bangladesh. It also suggested for organizing more MIL events for University students. Recommendations included allocating funds for MIL training programs, involving the government, strengthening knowledge dissemination methods, and developing standard curricula for MIL.

Hoq (2015) discussed the rural library and information services in the context of Bangladesh and highlighted the problems and prospects of rural library and information services. Chowdhury *et al.* (2011) examined the Central Public Library's (CPL) readiness to assume responsibility for IL education in Dhaka, Bangladesh. It found that the CPL needs to improve in IL education programs due to the lack of physical facilities, the absence of information retrieval tools, and the low level of professional education of library staff. The study emphasized the need for external help in terms of finance, professional expertise, facilities, and patronizations to properly address IL issues in the CPL. The paper also identified the problems faced by the CPL in enhancing IL. It suggested recommendations such as increasing library collections, introducing computerized cataloguing and IT facilities, and implementing IL education parameters. It highlights the threats to the IL program, including poverty, low literacy rates, high cost of education and books, inadequate infrastructure, and poor reading habits. Recommendations of the study are proposed to improve the situation and increase CPL's readiness, including forming a national committee on IL, increasing library collections, introducing computerized cataloguing and IT facilities, and implementing IL education parameters.

Islam and Tsuji (2010) assessed the IL competency of Information Science and Library Management (ISLM) graduate students at the University of Dhaka, Bangladesh, and identified their strengths and weaknesses. The study highlighted the need to incorporate an IL program in the course curriculum for ISLM graduate students at the University of Dhaka, Bangladesh, to enhance their IL competencies. The findings emphasized the importance of including writing, discussion, and other relevant activities to make the students more information literate. The paper suggested that the ISLM department should implement the proposed IL program to improve the understanding of the concept of IL among graduate students. The study also emphasized the need for primary and secondary schools to incorporate essential IL courses and activities to develop the overall IL situation in the country. The findings

revealed that the students had limited skills in IL, indicating a need to incorporate an IL program into the course curriculum.

Banik and Kumar (2019) examined undergraduate students' academic performance and IL skills in Bangladesh. It also investigated the impact of IL skill on students' academic performance. The study used primary data collected from 325 students and applied statistical and econometric methods. It measured the level of students' IL skills using an IL skills index. It used linear regression estimated by the OLS method to examine the impact of IL skills on students' academic performance. The study found that most students had a medium standard grade point average (GPA) and a lower level of IL skills. It identified that study hours, family income, class attendance, past academic results, and IL skills as significant factors influencing students' academic performance. It suggested improving nursing IL skill of students' to enhance their academic performance.

Shoeb (2011) assessed IL competency and perception of IL behaviour among Independent University Bangladesh's (IUB) fresh undergraduate business students. The study explored their IL competency and perception of IL behaviour. The survey included a set of structured questions to assess the student's level of information skills and IL competency, covering topics such as previous experience with information use, access to information sources, awareness, competency, and requirements related to IL. The study highlighted the importance of information literacy education (ILE) in addressing these issues. It emphasized the need for valid and relevant curricula for ILE in the higher education community in Bangladesh. The paper provided the first assessment of IL competency of private university in Bangladesh, specifically focusing on freshman undergraduate business students at IUB. The study's results contribute to develop an initial ILE curriculum for business students at IUB and potentially for the wider higher education community in Bangladesh.

Hossain and Sormunen (2023) described a novel pedagogical practice that improved library and information science students' IL knowledge in Bangladesh. The learning outcomes in IL were assessed through post-tests and the association between students' ICT self-efficacy and their IL learning were examined. Researchers also included five contact sessions for each module, where teachers demonstrated academic assignment

writing, encouraged students to explore exciting ideas, and guided them in the critical phase of identifying a meaningful research question. The paper highlighted the potential of inquiry-based approaches, such as guided inquiry for information literacy (GIIL), in developing students' IL skills by engaging them in realistic learning tasks. The research contributed to the field by providing insights into integrating IL instructions into the library and information science curriculum, making it an integral part of student's personal and professional practices. The study offered valuable experiences and guidance for educators and researchers interested in implementing student-centred pedagogical practices in developing countries.

Shuva (2006) highlighted the importance of IL in the 21<sup>st</sup> century, where individuals encountered abundant information choices and need to evaluate and use information effectively. It emphasized that IL was not limited to finding information but also includes understanding its limitations, managing and communicating information, and using it ethically and legally. The paper discussed the need for international cooperation in promoting and implementing IL initiatives in Bangladesh, where the term "Information Literacy" is not widely known and there was a shortage of trained professionals in the field. It recognized the challenges in implementing IL in Bangladesh, such as the shortage of trained professionals and expensive telecommunication infrastructure services. The paper suggested that IL is a pre-requisite for participating effectively in the information society and is part of the fundamental human right of lifelong learning.

### **2.2.5 Barriers to IL for achieving SDGs**

Promoting IL for achieving the SDGs in developing countries like Bangladesh faces numerous barriers. Having access to trustworthy and accurate information improves critical thinking abilities, fosters a feeling of social and environmental responsibility, and allows people to make well-informed decisions. The ability to navigate through the large quantity of accessible information, assess their reliability, and use them effectively to address difficulties related to SD is known as IL.

Adedokun (2018) examined the issue of SD through IL, emphasizing the importance of access to necessary information through digital devices for SD. In this study, the

researcher focuses on the adoption of the 2030 agenda for SD by the United Nations and emphasized the importance of literacy in achieving goals such as poverty eradication, universal primary education, and gender equality. The paper highlighted the importance of IL for SD and recommends strategies to help individuals acquire IL skills through digital devices.

Ezeani *et al.* (2017) investigated the work entitled “Towards sustainable development goals: what role of academic libraries in Nigeria in assuring inclusive access to information for learners with special needs?” highlighted the resources and amenities available in Nigeria for providing inclusive, egalitarian, and high-quality education to physically challenged and visually impaired students. The research involved students from six Federal government-funded universities across six geographical zones. The findings revealed that only one college had a dedicated area for disabled students, and the other five were working to establish one. Library services were found to be poorly presented, with no assistive technology or elevators for mobility. The work also highlighted the importance of information access for inclusive education and suggests policies and systems to support students with special needs. Dei and Asante (2022) focused that the library personnel were sensible in providing relevant materials to support students’ learning, organizing training on IL and assigning library patrons in periodic IL programs to create awareness of the SDGs goal 4. The libraries depend on the usual UN document on SDGs and SDGs goal 4 as a guide in information delivery. It was also discovered that libraries depend on general policies on information delivery, teaching and quality assurance of the universities in general and the libraries in particular because they didn’t had their personal internally developed policies on SDGs goal 4. In this study, researchers were mainly guided by a frame of the SDGs goal 4 in the library.

Holmes *et al.* (2022) explored the synergies and tensions between the UN SDGs and online learning and teaching (L&T) in higher education institutions (HEIs) through a global exploration of universities’ SDG-based L&T initiatives. The paper emphasized the need for careful consideration of equity in the design of online SDG education and the importance of ensuring that both online and offline L&T contribute to the transformational changes required by the SDGs. In this work, researchers identified five key approaches to embedding the SDGs into HEI L&T, including designing

curricula and pedagogy, orienting the students experience, aligning graduate outcomes, institutional leadership and capability building, and participating in cross-institutional networks and initiatives. The study concluded that alignment between theory and practice, equity considerations, and transformational changes in online and offline L&T are necessary for online education. Islam and Jirattikorn (2023) explored the underrepresentation of women in Science, Technology, Engineering and Mathematics (STEM) education in Bangladesh. It proposed a way to boost their participation to help achieve the SDG of ensuring quality education for all. While Bangladesh had taken steps to promote gender equality in education, measures directly targeting increased participation of women in STEM education where these are lacking. Researchers mentioned in this study that Bangladesh had seen remarkable progress in improving girls' enrollment at primary and secondary levels and some improvement in tertiary education. However, there was also a significant gap between the overall success in increasing women's participation in general education and their involvement in STEM subjects. Bangladesh can leverage the full potential of its female population and ensure that women are not left behind in the rapidly changing landscape of the global economy, which help Bangladesh close the gap towards achieving SDGs goal 4.

Assefa and Demissie (2019) mentioned in their paper entitled "Data and Information Literacy: Achieving Sustainable Development Goals in Africa" that librarians need the necessary skills and knowledge to play a vital role in the implementation of the SDG agenda. They also focused on valuable concepts, skills, methods and applications like research data lifecycle, metadata and data standards, data organization, data cleaning, data management plans, data repositories, tools and applications for data collection, analysis and visualization. Researchers also set out the agenda to offer a theoretical frame for libraries and librarians in Africa to become data and information literate. They focused on whether libraries and librarians are well prepared in data information skills, and they play a vital role in supporting the SDGs agenda. When healthcare, education, agriculture, climate change, etc. (integrated part of the SDGs) are supported by data service, libraries can play a vital role. This study explored the essential skills and required knowledge for librarians to contribute to the SDG agenda, focusing on data and IL concepts and tools.

Uzuegbu (2019) examined the impact of tailor-made IL provisions on Nigerian rural dwellers' participation in SD targets. The findings showed that rural dwellers who received IL provision participated more in SD targets than those who relied solely on existing information communication systems. The provision of IL had a spill-over effect on non-sampled households in the same village. The study concluded that effective participation in development programs can be achieved through contextual IL provision, and public libraries in Nigeria and similar developing countries can use this strategy to launch effective outreach services to rural dwellers.

Adekoya (2022) investigated the IL, information use and SD of higher education (HE) in Nigeria in this study entitled "Information literacy, information use and sustainable development of higher education in Nigeria". It was reflected that IL played a significant role in the SD of HE and that the extent of information use was high. It was revealed that the areas of HE that require SD include economic/finance and investment priorities; administration, mission and planning; and research and scholarship. In this study, a descriptive survey research design was used. The population for the study was the staff of public higher educational institutions in Southern Nigeria. In this study, the researcher emphasized that the SD of HE in the current academic enterprise requires that people be information literate and that information was extensively used. Therefore, significant attention should be paid to IL and information used to ensure the sustainability of the development of HE across all the nations of the globe.

Baba Abdulrahman *et al.* (2019) focused on their research, demonstrating that libraries played a vital role in promoting IL and providing access to relevant and current information materials. Still, some challenges need to be addressed for SD to be achieved. The paper emphasized the importance of IL and the role of libraries in achieving SD in Nigeria. It highlighted the need for individuals to have the skills to access, evaluate, and utilize information effectively and how this contributes to the attainment of SDGs.

Nwankwo *et al.* (2020) explored the role of Information and Communication Technology (ICT) in library services for SDGs in Nigeria, highlighting the challenges and the need to improve ICT adoption by libraries. The study recommended

enhancing the capacity and level of ICT adoption in libraries to contribute to Nigeria's SD effectively. The paper acknowledged the impact of ICT on the quality of information provided through libraries. It highlights various ICT-based services in libraries, such as reprographic technology, library retrieval systems, institutional repositories, and online readers advisory services. The paper concluded that ICT played a crucial role in providing library services for SDGs in Nigeria. Researchers recommended that libraries enhance their ICT resources and services to meet the information needs of citizens and contribute to the SD of Nigeria.

Dale and Newman (2005) distinguished SD education from environmental education and emphasized the importance of problem-based interdisciplinary learning in SD education. It suggested practitioners incorporate a multidisciplinary approach and problem-based applied learning to design and teach SD programs. Mbagwu *et al.* (2020) focused on the issues impeding the achievement of food security and good health including natural disasters, inefficient food distribution, inadequate food packaging, processing, and storage, social support networks, delayed information delivery, the physical environment, and inappropriate media for information dissemination. This work used an exhaustive evaluation of relevant literature and a case study to take an exploratory approach. The results showed that the community lacked knowledge about agriculture, including where to locate the most fantastic range of farm inputs, receive agricultural loans, and shop for the best deals on items. The rural host's members lacked of access to health information as well. The study also suggested that academic libraries may accomplish SDGs goal 2 and 3 by repurposing agricultural and health knowledge in a way that makes it accessible to rural populations and in a language that they can comprehend. Libraries can work with specialists in agriculture and health to offer extension services to the communities they serve.

Mansour (2020) discussed the potential role of Egyptian rural public libraries towards the attainment of SDGs. This study concluded that Egyptian rural public libraries have struggled to be part of the United Nations agenda for the implementation of the SDGs. Popoola (2019) discussed how libraries help improve health literacy to achieve SDG-3 in developing countries. Bradley (2016) focused on the world with universal literacy and discussed the role of libraries and access to information in the UN 2030

Agenda. Kear (2018) discussed in a workshop how libraries could work to achieve the UN 2030 Agenda. Jain and Jibril (2017) highlighted some preliminary observations from Botswana public libraries in achieving SDGs.

### **2.2.6 Challenges faced by university libraries in promoting IL achieving SDGs**

University libraries in Bangladesh are facing several challenges in promoting IL, including resource limitations, inadequate infrastructure, and a lack of trained personnel. Working together, educators and librarians can effectively integrate IL into the curriculum. Faculties can play a key role in promoting IL skills and incorporating SDGs into their courses. University libraries also need to interact with stakeholders and the larger academic community, educating people about the value of IL for SD. This can be achieved through workshops, seminars, and partnerships with other institutions.

Hicks and Lloyd (2021) employed discourse analysis to identify conflicting narratives in the discourse of IL practice within higher education, with one narrative positioning IL as an empowering practice and the other narrative positioning learners as incompetent or lacking the ability to operate within higher education. The study aimed to interrogate IL's epistemological premises and discourses within higher education. The study analyzed book introductions and professional texts to understand how learners were positioned concerning IL. This research was part of a broader program examining higher education discourses on IL, learners, and librarians.

Omona (2020) examined the contribution of library and information services in achieving the UN SDGs based on Uganda's Vision 2040. It emphasized the importance of effective and sustainable library and information services management in attaining all the SDGs. It called to the Government of Uganda to prioritize this sector to enhance literacy and enlightenment. Unegbu *et al.* (2023) investigated the role of libraries and librarians in implementing SDGs in their work entitled "Information Literacy and Sustainable Development Goals Implementation: The Role of Libraries and Librarians." This study focused on how libraries can streamline services, encourage stakeholder participation, and facilitate collaboration. Researchers

identified opportunities and challenges in SDG implementation. Researchers also recommended some suggestions to the librarians, and libraries were strategically positioned to realizing the SDGs agenda. Libraries' dependability and inclusiveness make them essential for achieving SDGs. However, the paper recommended not to viewing libraries as a means to enrich themselves, establishing an integrity body to monitor library projects, and engaging in advocacy programs to inform the public.

Anasi *et al.* (2018) explored the role of university libraries in using ICTs to accelerate the achievement of SDGs in this article. The study found that university libraries in Ogun State, Nigeria, actively provide ICT facilities for 21st-century library services. ICTs had the potential to bridge digital gaps and contribute to the attainment of SDGs. However, challenges such as illiteracy, lack of political accountability and transparency, lack of financial resources, and inadequate power supply hindered the achievement of SDGs in Ogun State. The paper emphasized the importance of university libraries in bridging digital gaps and highlighted the critical role of ICTs in accelerating the realization of SDGs. The findings suggested that libraries play a crucial role in actualizing SDGs, and ICTs can help bypass historic development constraints. If adequately provided, libraries can facilitate the actualization of the SDGs agenda at all levels in Nigeria.

Okuonghae and Igbinovia (2019) focused their article entitled "The Role of Academic Libraries towards the Attainment of Sustainable Development Goals: The Nigerian Perspective", to improve Nigeria's quality of life by examining how academic libraries can contribute to the UN's developmental agenda. A survey of 270 librarians from 18 university libraries across Nigeria's six geopolitical zones was conducted, with a 75% response rate. The findings suggested that academic libraries can help Nigeria achieve its SDGs by providing access to information resources and a comfortable studying environment. However, insufficient staff training and poor networking among libraries and professionals hindered their ability to provide necessary information services.

Rafiq *et al.* (2020) investigated the IL practices and methods used by professional librarians in university libraries of Lahore, Pakistan. The results indicated that most academic libraries in Lahore used basic IL practices, with hands-on practice being the

preferred delivery method for IL instructions. They found that most academic libraries in Lahore used basic IL practices, with hands-on practice being the preferred delivery method for IL instructions. A quantitative method based on a descriptive research design was used, and data were collected through a cross-sectional survey method. Professional librarians at government and non-government university libraries had the same perception regarding the effectiveness of IL instruction methods. The study recommended integrating IL instructions at all university levels to help students become life-long and independent learners.

Atta-Obeng and Dadzie (2020) suggested a partnership between public and academic libraries to promote lifelong learning. Public libraries were recommended, but academic libraries should function as community centres. Institutions like, the Ghana Library Association (GLA) and the Ministry of Education should intensify collaboration, assign specific roles, and ensure compulsory IL teaching in all universities. Researchers also examined the role of academic libraries in promoting knowledge and skills for lifelong learning among students in Ghana. The findings showed that academic institutions significantly contribute to lifelong learning by providing access to relevant information, training on research publications, search strategy, communication skills, IL, and reading. The study offers insights for academic librarians and decision-makers in disseminating measures for promoting knowledge and skills for lifelong learning opportunities in Ghana.

Mashroofa (2022) explored how libraries can contribute to the UN SDGs. It focuses on developing strategies for libraries to incorporate SDGs into their projects and programs. The study found that academic libraries in Sri Lanka included SD in their services, programs, and resources, eight institutions have not mapped their efforts to the SDGs. The study recommended that academic libraries map SDGs to their programs, services, and resources. Universities that hadn't included SD in their strategic plans may consider incorporating it in future plans. The librarian had to evaluate existing programs and resources to align with SDGs.

Popoola (2019) focused his work entitled "Involving libraries in improving health literacy to achieve SDG-3 in developing economies: a literature review" on obtaining excellent health in society had been related to health literacy and increasing it in

underdeveloped nations may help reach SDG-3. This work analyzed relevant literature from academic databases and identified six key topics. The evaluation aimed to determine steps libraries can take to enhance health literacy and information access for consumers and healthcare professionals in developing nations, particularly Nigeria. The study concluded that libraries in developing countries must increase health literacy among their patrons to play a significant role in achieving SDG-3.

Researcher studied on information literacy, e.g., Islam and Tsuji (2010) assessed the IL competency of graduate students at Dhaka University; Shoeb (2011) carried out the IL competency of freshman business students of a private university; Hoq (2006) argued how IL programs can be an eye-opener for the government and educational institutions in Bangladesh. But none of those studies combined the IL and SDGs. The review had revealed a knowledge gap in the area of IL for achieving SDGs for the LIS professionals in Bangladesh.

The literature review reveals a significant body of research on IL, its importance in higher education, and its role in achieving the SDGs. IL is recognized as a critical competency for navigating the complex information landscape, with substantial implications for lifelong learning and SD. University libraries are central to promoting IL, yet they face numerous challenges, particularly in developing countries like, Bangladesh, where resource limitations, technological barriers, and lack of awareness impede the effectiveness of IL programs. The review identifies a notable gap in the existing research. While IL and SDGs have been studied separately, there is a lack of comprehensive research on how IL initiatives can be effectively integrated with SDG-focused strategies in Bangladeshi university libraries. This gap points to the need for further investigation into how university libraries can align their IL programs with SD objectives.

### **2.3 Research gap and uniqueness of the study**

Despite extensive research on IL and its role in higher education and SD, there remains a critical gap in understanding how university libraries in developing countries, particularly Bangladesh, can systematically integrate IL initiatives to support the achievement of the SDGs. Existing studies primarily focus on IL's impact

on academic performance, lifelong learning, and digital literacy, yet there is a noticeable lack of research linking IL directly to SDG-related outcomes in university libraries. Additionally, while research has highlighted the challenges libraries face in promoting IL, there is a scarcity of comprehensive frameworks, strategic interventions, and policy recommendations that align IL programs with SD objectives.

This study stands out by examining IL from a multidimensional perspective. It not only explores the current status of IL initiatives in Bangladeshi university libraries but also evaluates the relationship between IL and the SDGs through research objective 1 and research objective 2. It further identifies key factors and strategic measures that can enhance IL initiatives for SD, including user engagement, institutional policy development, and knowledge-sharing that can strengthen IL initiatives for sustainable development, as addressed in research objective 3 and research objective 6. Unlike previous research, this study employs statistical analyses, including descriptive statistics, reliability testing, and hypothesis testing, to evaluate IL's effectiveness and its impact on SDG attainment. The inclusion of perception, awareness, and satisfaction analyses among different universities and user categories guided by research objective 4 and research objective 5 make this study particularly significant.

Moreover, by formulating and testing hypotheses (H1–H6), this research bridges the gap between theoretical IL models and practical implementation strategies, offering evidence-based recommendations for university libraries to integrate IL into academic curricula, foster collaboration with stakeholders, and develop structured IL programs. By doing so, this study contributes to a novel, data-driven approach to IL development in Bangladesh, setting a foundation for future research and policy formulation to enhance libraries' roles in achieving SDGs.

## **2.4 Theoretical framework**

The study comprises the theoretical framework and developed the hypotheses based on this framework. The theoretical framework is integral to any research as it supports the study with well-known theories and models, giving a structured frame through which the research problem is examined. In social research practice, theory serves as a guide, assisting researchers to construct their queries and interpret their results and

findings. This chapter framework the theoretical basics of the study, integrating applicable models and theories connected to IL and SDGs. The chapter initiates with a discussion on the significance of theory in research, shadowed by the Information Literacy and Sustainable Development Model (ILSDM) developed for this study. The chapter also offers the hypotheses articulated based on the theoretical perceptions and identified research gaps.

A theoretical framework provides a foundation for understanding the research problem and guides the research design and methodology development. In this study, the ILSDM is adopted, drawing on various theoretical perspectives to create a comprehensive framework that aligns IL initiatives with the SDGs in the context of university libraries in Bangladesh.

Theoretical orientation is essential in social research since research is set against an existing theory. Twumasi (2001) believed a fundamental interrelationship exists between theory and research, as a researcher cannot operate effectively without a theory. Therefore, a body of theories was needed to aid in constructing one's research model and to guide one's analysis. According to Dale (1998), theories enable researchers to draw new conclusions, improve action, and generate more sophisticated theories. Theories are drawn from observations and confirmed observations. For example, Isaac Newton saw the apple fall and, thus, developed the theory of gravity. Again, a theory is a system for explaining phenomena, which states, constructs and the laws that interrelates the constructs to one another (Mugenda and Mugenda, 2003).

#### **2.4.1 Information literacy and sustainable development model (ILSDM)**

Over the years, information literacy became an area of interest to several academicians and library professionals leading to several models development. This study adopted Doyles' (1999) theory of information literacy. The theory identifies an information-literate person as one whom recognizes the information that is accurate and complete is the basis for intelligent decision-making; acknowledges the need for information; integrates new information into an existing body of knowledge; and evaluates information, organizes information, and uses information for critical thinking and problem-solving. The IL and ILSDM draw the synergies between IL

theories and SD frameworks. The ILSDM integrates vital elements from several theoretical perspectives to provide a comprehensive understanding of the relationship between IL programs in university libraries and achieving SDGs in the context of Bangladesh.

#### **2.4.2 Information literacy theories**

*Buckland's Information Literacy Model:* Buckland's model emphasizes identifying, locating, evaluating, and using information. This model forms the basis for understanding how individuals interact with information, which is critical for developing effective IL programs within university libraries. It provides a foundational understanding of the skills and competencies required for IL. This model emphasized the importance of IL as a process of identifying, locating, evaluating, and using information. It serves as the foundation for understanding how individuals interact with information, guiding the development of IL programs within university libraries.

*Bruce's Seven Faces of Information Literacy:* Bruce's model expands the concept of IL to encompass seven dimensions, including the practical, critical, creative, and affective aspects. It informs the design of holistic IL programs that go beyond basic skills, aligning with the multifaceted nature of SDGs.

#### **2.4.3 Sustainable development frameworks**

*Brundtland's Sustainable Development Theory:* The Brundtland Report's definition of sustainable development is as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" forms the basis for understanding the overarching goals of SD. The ILSDM incorporates this definition to contextualize the role of university libraries in promoting sustainable practices.

*SDGs as a Framework:* The ILSDM aligns with the specific goals and targets outlined in the United Nations' SDGs. Each SDG is considered a lens through which the effectiveness of IL initiatives can be assessed, particularly in how they contribute to sustainable educational practices and equitable access to information. The SDGs provide a structured framework for evaluating the effectiveness and relevance of IL initiatives.

#### **2.4.4 Library and information science theories**

*User-centred design:* This theory emphasizes tailoring IL programs to meet library users' specific needs and preferences. The ILSDM integrates user-centred design principles to ensure that IL programs are tailored to the needs and preferences of students and faculties. This approach emphasizes active participation, collaboration, and continuous feedback loops, enhancing the overall effectiveness of the programs.

*Library as a learning organization:* This concept views libraries as dynamic entities that continuously adapt and evolve to meet the changing needs of their users. Drawing on the concept of the library as a learning organization, the ILSDM acknowledges the dynamic and adaptive nature of university libraries. Libraries are seen as entities that continuously learn, evolve and align their services with the changing needs of the academic community and the broader societal context. By incorporating this perspective, the ILSDM recognizes the importance of libraries being proactive in developing IL programs that align with SDGs.

#### **2.4.5 Social learning theories**

*Vygotsky's social development theory:* The ILSDM incorporates Vygotsky's theory, emphasizing social interaction and collaborative learning. The theory highlights the importance of social interaction and collaborative learning in the development of IL skills. It recognizes that IL is not solely an individual endeavour but a socially constructed process. The model underscores the importance of collaborative efforts within university libraries to foster a community of learners focused on SD.

*Community of practice:* This concept underscores the value of collaborative efforts in fostering a learning community. By integrating the community of practice into the ILSDM, the model encourages the development of networks where students, faculties, and librarians share knowledge and experiences, thereby enhancing the collective impact on achieving the SDGs.

The IL and SD Models provide a comprehensive framework for analyzing, designing, and evaluating IL programs in university libraries of Bangladesh. By synthesizing these diverse theoretical perspectives, the model facilitates a nuanced understanding of the dynamic interplay between IL and SD within the specific cultural and educational context of Bangladesh.

IL is very vital for the growth of the society in which we live. IL enables individuals to make informed decisions on their own. From the above, the theory that governs IL can also be considered the characteristics that an information literacy person should possess. This means that information should be able to locate needed information, evaluate the retrieved information, and use information ethically and legally.

## **2.5 Significance of theory**

The significance of theory in research lies in its ability to deliver an introductory framework that escorts the whole research procedure. Theory is a medium through which scholars can interpret data, make sense of complex phenomena, and launch relationships between variables. It aids in defining the possibility of the study, articulating hypotheses, and assembling the analysis. By grounding research in established theoretical viewpoints, investigators confirm that their work are relevant, procedurally sound, and contributes to the broader body of knowledge. Theory also enables the repetition of studies and the judgment of discoveries across various backgrounds, improving the consistency and rationality of research consequences. Eventually, the addition of theory in research not only benefits in understanding the subject matter but also in producing new dimensions and progressing academic dissertations.

## **2.6 Hypothesis formulation and conceptual framework**

### **2.6.1 Hypothesis formulation**

Developing hypotheses is integral to aligning the research with its theoretical framework and identifying research gaps. Each hypothesis corresponds to specific research objectives, guiding the investigation and providing a basis for empirical analysis. The hypotheses are formulated to explore the current state of IL initiatives in Bangladeshi university libraries, their alignment with SDGs, and the challenges faced in promoting these initiatives. The development of hypotheses provides a structured approach to testing the assumptions and relationships underlying this study. Each hypothesis is carefully aligned with the research objectives and the theoretical framework, enabling a comprehensive examination of the role of IL in achieving SDGs within the context of university libraries in Bangladesh. The hypotheses are:

*H1:* There is an impact of uniform IL initiative in university libraries of Bangladesh on achieving SDGs.

*H2:* There is a relationship between promotion of IL and the progress SDGs.

*H3:* There are key factors of IL such as user engagement and skill development, digital literacy training, environmental well-being, and financial support that contribute to achieving SDGs.

*H4:* There is a relationship between the level of awareness and satisfaction regarding IL initiatives among different universities and user categories.

*H5:* There is a positive impact of IL programs on achieving SDGs.

*H6:* There are limitations such as inadequate funding, lack of awareness, and insufficient infrastructural support that hinder IL activities from attaining SDGs.

The details of the hypotheses formulation are given below:

#### ***2.6.1.1 Impact of IL initiatives on SDG attainment***

IL is recognized globally as a crucial competency for personal and professional development. Still, the extent to which Bangladeshi university libraries have developed and aligned their IL initiatives with the SDGs remains to be determined. Theoretical models such as Buckland's Information Literacy Model and Bruce's seven faces of IL suggest that comprehensive IL programs should encompass a broad range of competencies and align with overarching goals like the SDGs. However, preliminary research indicates that IL initiatives in Bangladesh may be underdeveloped or lack the integration to contribute to SD effectively. This hypothesis tested by evaluating the existing IL programs against established frameworks and identifying gaps in their alignment with the SDGs. Thus, the research hypothesized that *H1: There is an impact of uniform IL initiative in university libraries of Bangladesh on achieving SDGs.*

#### ***2.6.1.2 Correlation between IL promotion and SD progress***

The second hypothesis posits a direct correlation between effective IL programs and the advancement of the SDGs. Theoretical perspectives such as Brundtland's definition of SD, which emphasizes the need for development that meets current needs without compromising the ability of future generations to meet their own, align closely with the goals of IL. The SDGs framework further reinforces this connection by highlighting the critical role of education, knowledge dissemination, and

information access in SD. In the context of university libraries, promoting IL involves equipping students, faculties, and the broader academic community with the skills necessary to locate, evaluate, and use information effectively. This, in turn, empowers them to contribute more meaningfully to achieving the SDGs. For example, IL initiatives that focus on critical thinking, problem-solving, and ethical use of information directly support SDGs goal 4 (Quality Education) by fostering a well-informed and educated populace. Moreover, integrating IL into academic curricula can enhance the capacity of individuals to address various SDG-related challenges, such as poverty, inequality, and environmental sustainability. As university libraries in Bangladesh strive to align their IL programs with the SDGs, they not only enhance the educational outcomes of their users but also contribute to broader societal goals. Therefore, this hypothesis suggests that a strong commitment to promoting IL within university libraries is instrumental in driving progress towards achieving the SDGs in Bangladesh, creating a ripple effect that extends beyond the academic environment to influence SD at a national level. Thus, the research hypothesized that *H2: There is a relationship between promotion of IL and the progress SDGs.*

#### ***2.6.1.3 Influence of institutional gaps on the effectiveness of IL programs***

Hypothesis 3 addresses the concern that university libraries in Bangladesh may not have the necessary strategies or resources to promote IL programs that align with the SDGs effectively. Drawing on theoretical frameworks like the library as a learning organization and user-centred design, which emphasize the importance of strategic planning and resource allocation in educational settings, this hypothesis suggests that the absence of these elements could hinder the libraries' ability to contribute to SD. The research explore whether well-developed strategies and sufficient resources support existing IL initiatives and how these can be enhanced to serve the SDGs better. Thus, the research hypothesized that *H3: There are key factors of IL such as user engagement and skill development, digital literacy training, environmental well-being, and financial support that contribute to achieving SDGs.*

#### ***2.6.1.4 Categorical variation in perceptions, awareness, and satisfaction***

Hypothesis 4 is based on the premise that there may be significant variations in IL's perception, awareness, and satisfaction levels among different categories of university library users in Bangladesh. Theoretical insights from Vygotsky's social development

theory and the community of practice concept suggest that IL programs' effectiveness is closely tied to the university's social and collaborative learning environment. This hypothesis tested by examining the differences in IL perceptions among users from various university categories (e.g., public vs. private) and user groups (e.g., students and faculties). The findings help identify gaps in IL awareness and satisfaction, which are crucial for tailoring IL programs to meet diverse user needs. Thus, the research hypothesized that *H4: There is a relationship between the level of awareness and satisfaction regarding IL initiatives among different universities and user categories.*

#### ***2.6.1.5 Challenges of IL program implementation***

Hypothesis 5 focuses on the challenges that university libraries in Bangladesh may encounter in promoting IL programs aligned with the SDGs. Drawing from the theoretical concepts of the library as a learning organization and the barriers to effective IL, this hypothesis posits that constraints such as limited financial resources, lack of trained personnel, and inadequate infrastructure are significant impediments. These challenges are likely to affect the libraries' ability to implement and sustain IL initiatives that contribute to the SDGs. The research investigate these barriers in detail, providing insights into how they impact the libraries' operations and what measures can be taken to overcome them. Thus, the research hypothesized that *H5: There is a positive impact of IL programs on achieving SDGs.*

#### ***2.6.1.6 Effect of strategic IL integration and collaboration on SDG progress***

The formulation of hypothesis 6 is based on the premise that structured IL strategies, integration into academic curricula, and collaborative partnerships can significantly enhance IL's role in achieving the SDGs. Existing literature highlights that embedding IL into university curricula fosters critical thinking and lifelong learning, which are essential for SD. Empirical data from university libraries suggest that strategic IL initiatives and institutional support improve user engagement and program effectiveness. Additionally, global best practices emphasize the importance of collaboration between libraries, educators, and policymakers in strengthening IL's impact on SDGs. Therefore, *H6: There are limitations such as inadequate funding, lack of awareness, and insufficient infrastructural support that hinder IL activities from attaining SDGs.*

### 2.6.2 Conceptual model

A conceptual model was developed to investigate the extent of the understanding of IL and SDGs of the university library users and professionals of Bangladesh, as well as to explore how university libraries can promote IL to achieve the SDGs in these university libraries. The model was built using seven factors from the thesis questionnaire (Appendices 1 and 2). These are Uniform IL initiatives promotes SDGs; Relationship between IL and SDGs; Effective strategies contribute to achieving SDGs; Awareness and satisfaction regarding IL initiatives; Impactful IL programs; Lack of funding, awareness and infrastructural support hinder SDGs; and achieve SDGs. Here, Achieve SDGs is regarded as the dependent variable, while the other factors are treated as independent variables. The relationship between IL, SDGs, and University Libraries in achieving the SDGs is shown in the following Figure 2.2.

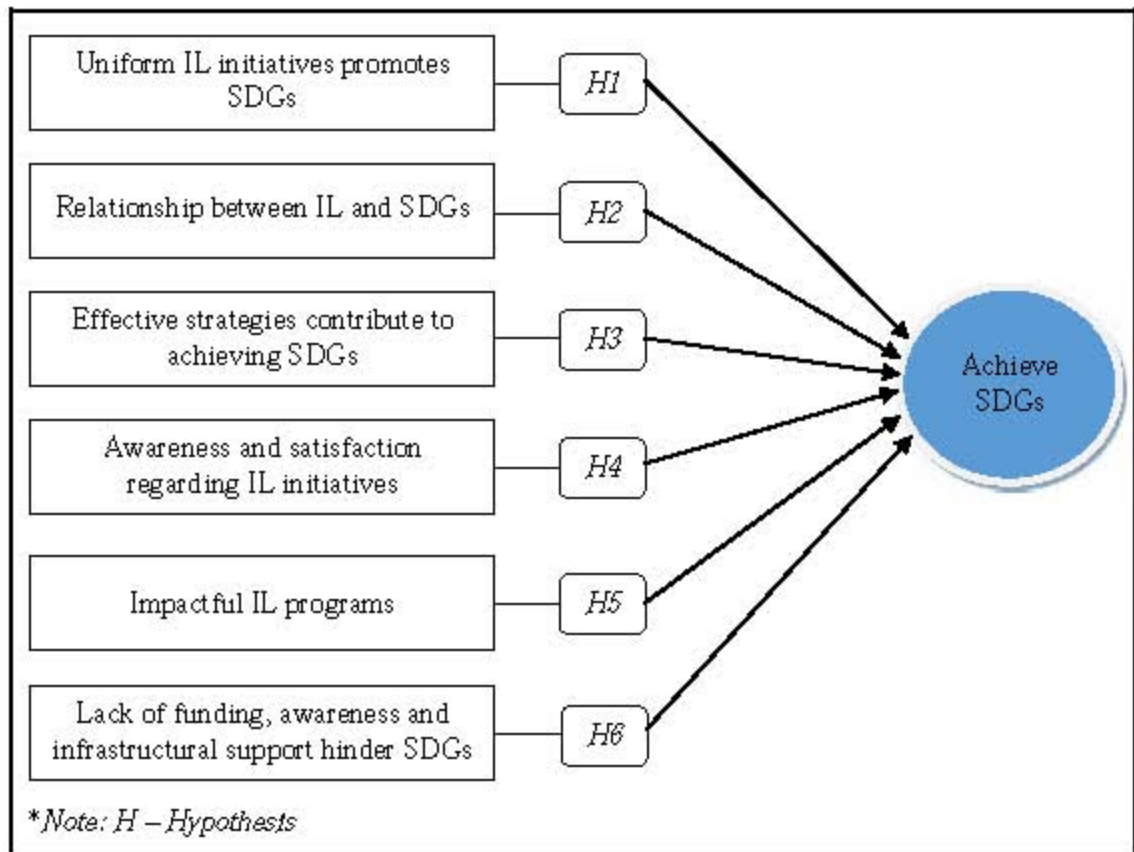


Figure 2.2: Hypothesized research conceptual model

This conceptual model (Figure 2.2) emphasizes the symbiotic relationship between IL, SDGs, and the role of university libraries. This model outlines how university libraries in Bangladesh, by promoting IL, play a critical role in achieving the SDGs. It demonstrates how university libraries can serve as catalysts for achieving SDGs by promoting IL among students, researchers, and the broader community in Bangladesh.

The model hypothesizes that IL initiative in libraries leads to improved awareness, engagement, and critical thinking among students and researchers, which contributes to SDG achievement.

## **2.7 Chapter summary**

This chapter has reviewed the key concepts related to IL, SDGs, and university libraries' role in promoting IL in Bangladesh. The results of a systematic review of the literature using the PRISMA diagram are based on the goals and objectives of the study. Initially, the review's scope is explained. This chapter evaluates earlier research on IL, SDGs, and their significance among professionals and consumers of university libraries from different parts of the world, including Bangladesh. The literature underscores the importance of IL in achieving SD, yet it also reveals significant challenges in implementing effective IL programs, especially in developing contexts like Bangladesh. The six main themes in the literature review section are accompanied by the detailed findings of the relevant previous studies, as shown in the PRISMA diagram (Figure 2.1). The final section of the chapter also examines and reports the gaps in the existing literature. The identified gaps in the literature indicate a need for further research on strategies that can enhance the role of university libraries in promoting IL to support the SDGs. This study aims to address these gaps by exploring how university libraries in Bangladesh can effectively promote IL to achieve the SDGs, thereby contributing to both academic research and practical solutions for SD.

The theoretical framework developed in this chapter to deliver a comprehensive arrangement for understanding the character of IL in attaining SDGs within Bangladeshi university libraries. By integrating various theoretical perspectives from IL models to SD frameworks and social learning theories, the study is positioned to explore the complexities and challenges of implementing effective IL programs. The hypotheses settled from this framework tested in the following chapters, offering an understanding of how university libraries can better contribute to SDGs to achieve improved IL enterprises. Finally, a conceptual model along with hypotheses is introduced.

**CHAPTER THREE**  
**RESEARCH**  
**METHODOLOGY**

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter outlines the research methodology adopted to investigate the role of university libraries in promoting Information Literacy (IL) to achieve the Sustainable Development Goals (SDGs) in Bangladesh. The chapter presents the research design, population and sample, data collection instruments, procedures, and analysis techniques used in the study. A quantitative research approach was primarily employed, using two sets of structured questionnaires administered to library professionals and library users across selected universities. The responses were analyzed using statistical techniques such as descriptive statistics, Analysis of Variance (ANOVA), and correlation analysis using SPSS software. To enrich the quantitative findings, thematic analysis was performed on a limited number of open-ended questions, providing qualitative insights into perceptions and challenges. Additionally, a systematic literature review was conducted in alignment with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to support the theoretical and empirical foundation of the study. This mixed yet quantitatively driven design offers a comprehensive understanding of IL initiatives and their alignment with SDG objectives.

To ensure the adequacy of the sample for factor analysis, the Kaiser-Meyer-Olkin (KMO) test is conducted, descriptive statistics, including measures of central tendency and dispersion, are applied to summarize the data, while reliability analysis using Cronbach's Alpha is applied to ensure internal consistency. Furthermore, inferential statistical techniques are employed to assess the significance of relationships between variables. Ethical considerations are carefully addressed to maintain the integrity of the research. By establishing the above systematic and statistically sound methodological framework, this chapter ensures the credibility and reliability of the study's findings.

On the other hand, qualitative data gathered through open-ended questions were examined by adopting thematic content analysis. Answers were initially studied

comprehensively to recognize repetitive forms, keywords, and thoughts. Based on this, the data were characterized into strategic themes such as perceived benefits of IL, suggestions for improvement, and challenges faced in IL implementation. Coding was piloted manually to confirm appropriate understanding, and typical quotes were nominated to demonstrate user viewpoints. This qualitative analysis supplemented the quantitative findings, showing the more profound insights into users' attitudes, experiences, and expectations regarding IL and its role in attaining the SDGs.

### 3.1.1 Research methodology flow chart

The following flowchart depicts the research methodology adopted in this study.

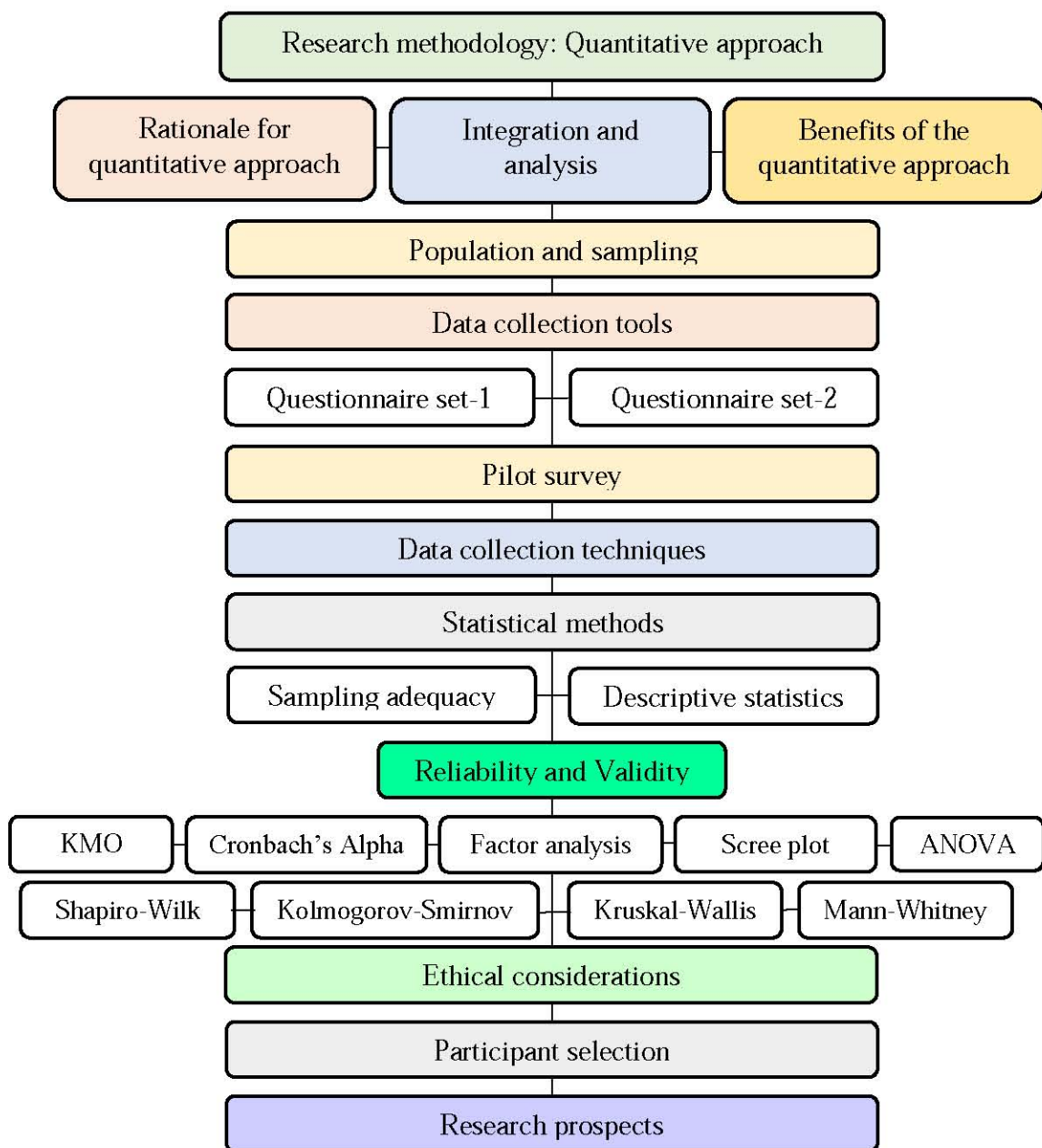


Figure 3.1: Research methodology flow chart

### **3.2 Research methodology: Quantitative approach**

The study primarily adopted a quantitative research approach using two structured questionnaires, one for library professionals and one for library users to examine the role of university libraries in promoting IL for achieving the SDGs in Bangladesh. Quantitative data were analyzed using descriptive statistics, ANOVA, and correlation analysis through SPSS, with significance levels assessed via p-values. To complement the quantitative findings, responses to a few open-ended questions were subjected to thematic analysis, offering more profound insights into institutional challenges and user experiences. Additionally, a systematic literature review was conducted following the PRISMA standard to support the study's context and theoretical foundation.

The study uses an ANOVA to find the significant differences in awareness towards United Nations Sustainable Development Goals (UN SDGs) among library professionals by university categories, various groups of people, such as faculties, students, and researchers. Additionally, the study examines the differences among public, private, and international universities' users.

#### **3.2.1 Rationale for quantitative approach**

A quantitative research method is mostly suitable for this study, as it allows for systematic measurement and statistical analysis of variables related to IL initiatives and their alignment with the SDGs. The use of structured questionnaires supported the collection of objective, similar data from a large number of respondents, consisting of library personnel and users across selected universities. This method enables the identification of outlines, relationships, and differences among variables, such as consciousness, perception, institutional support, and IL implementation status, using statistical tools like mean, correlation, and significance testing. The quantitative method ensures the reliability and generalizability of findings, making it suitable for assessing the broad impact and challenges of IL programs in a measurable and evidence-based manner.

#### **3.2.2 Integration and analysis**

The integration of quantitative and insightful data occurs during the analysis phase. Triangulation, where findings from one method are compared and contrasted with the other, enhances the validity and reliability of the users' conclusions. Quantitative data analyze using SPSS software, while commentary and insightful data are undergone thematic analysis to identify recurring themes, patterns, and unique perspectives.

The integration and analysis are conducted to comprehensively address the research objectives, questions, and hypotheses regarding the role of university libraries in promoting IL to achieve the SDGs. This section focuses on how quantitative and commentary data are integrated to generate strong and multifaceted insights into the study. This approach enhances the validity, reliability, and depth of the study's conclusions. Quantitative data gathered through structured questionnaires are analyzed using SPSS software to examine frequencies, means, correlations, and ANOVA to identify significant relationships and group differences. On the other hand, explanatory and descriptive data collected from open-ended responses are analyzed thematically to extract recurring themes, patterns, and contextual insights that added depth to the numerical data.

### **3.2.3 Benefits of the quantitative approach**

The quantitative approach was selected for this study to enable a structured, objective, and statistically valid examination of IL initiatives and their contribution to achieving the SDGs in Bangladeshi university libraries. By utilizing two sets of structured questionnaires targeted at library professionals and users, the study gathered measurable data on awareness, perception, institutional support, implementation status, and challenges. This approach allowed broad generalization, the identification of patterns, and testing hypotheses through descriptive and inferential statistics, including mean scores, correlations, and significance levels (p-values).”

In addition to quantitative data, responses to a few open-ended questions were analyzed thematically to capture contextual insights and practical suggestions from participants. This qualitative element supported the interpretation of statistical trends and added depth to the understanding of user experiences and institutional perspectives, ultimately enriching the study's findings and recommendations.

## **3.3 Population and sampling**

The Quacquarelli Symonds (QS) World University Rankings is a collection of university rankings compiled by Quacquarelli Symonds, a corporation specializing in higher education analytics (QS World University Rankings, 2024). There are 55 public universities, 114 private universities, and three international universities in Bangladesh (UGC, 2024). To conduct the research, 25 universities were chosen,

specifically from the top 25 Bangladeshi universities evaluated by QS Rank 2024. These include 12 public universities, 12 private universities, and one international university, all of which are in the top 25 in the country (Table 3.1).

**Table 3.1: Selected Universities of the study** (Source: QS Ranking, 2024)

| Natl. Rank | Asia Rank | Name of the University                                                  | Establish Year | Type    | Location   |
|------------|-----------|-------------------------------------------------------------------------|----------------|---------|------------|
| 1          | 140       | University of Dhaka (DU)                                                | 1921           | Public  | Dhaka      |
| 2          | 187       | Bangladesh University of Engineering and Technology (BUET)              | 1961           | Public  | Dhaka      |
| 3          | 191       | North South University (NSU)                                            | 1992           | Private | Dhaka      |
| 4          | 281-290   | BRAC University (BU)                                                    | 2001           | Private | Dhaka      |
| 5          | 351-400   | Jahangirnagar University (JU)                                           | 1970           | Public  | Dhaka      |
| 6          | 351-450   | Dhaka University of Engineering and Technology, Gazipur (DUET)          | 2003           | Public  | Gazipur    |
| 7          | 401-450   | Daffodil International University (DIU)                                 | 2002           | Private | Dhaka      |
| 8          | 401-450   | Shahjalal University of Science and Technology (SUST)                   | 1986           | Public  | Sylhet     |
| 9          | 451-500   | University of Rajshahi (RU)                                             | 1953           | Public  | Rajshahi   |
| 10         | 451-500   | Chittagong University of Engineering and Technology (CUET)              | 2003           | Public  | Chattogram |
| 11         | 451-500   | Islamic University of Technology (IUT)                                  | 1981           | Intl.   | Gazipur    |
| 12         | 451-500   | East West University (EWU)                                              | 1996           | Private | Dhaka      |
| 13         | 501-550   | Khulna University of Engineering and Technology (KUET)                  | 1967           | Public  | Khulna     |
| 14         | 501-550   | Rajshahi University of Engineering and Technology (RUET)                | 1964           | Public  | Rajshahi   |
| 15         | 551-600   | Ahsanullah University of Science and Technology (AUST)                  | 1995           | Private | Dhaka      |
| 16         | 551-600   | Stamford University Bangladesh (SUB)                                    | 2002           | Private | Dhaka      |
| 17         | 551-600   | Jashore University of Science and Technology (JUST)                     | 2007           | Public  | Jashore    |
| 18         | 601-650   | Khulna University (KU)                                                  | 1991           | Public  | Khulna     |
| 19         | 551-600   | Independent University Bangladesh (IUB)                                 | 1993           | Private | Dhaka      |
| 20         | 601-650   | United International University (UIU)                                   | 2003           | Private | Dhaka      |
| 21         | 701-750   | International University of Business Agriculture and Technology (IUBAT) | 1991           | Private | Dhaka      |
| 22         | 701-750   | University of Chittagong (CU)                                           | 1966           | Public  | Chattogram |
| 23         | 751-800   | University of Asia Pacific, Bangladesh (UAPB)                           | 1997           | Private | Dhaka      |
| 24         | 751-800   | American International University Bangladesh (AIUB)                     | 1994           | Private | Dhaka      |
| 25         | 800+      | University of Liberal Arts, Bangladesh (ULAB)                           | 2004           | Private | Dhaka      |

### **3.3.1 Population**

The participants in this study are library administrators who are supposed to be involved with IL practice in the library and as users: the participants are faculty members, students, and researchers from the chosen universities of Bangladesh.

### **3.3.2 Sample**

A purposive sampling method is employed to manage the extensive population size of the selected universities effectively. This approach ensures data collection from current library users, making the study more practical and feasible. The Krejcie and Morgan method is widely used in behavioral and social science research to determine sample size without manual calculations. It suggests that for population of 1,000,000 or more, a sample of 384 respondents is adequate (Krejcie and Morgan, 1970; Memon *et al.*, 2020). Furthermore, Sekaran and Bougie (2010) stated that a minimum of 384 respondents is necessary for a population of 75,000 or more. Roscoe (1975) also recommended that a sample size between 30 and 500 is appropriate for most research studies, with at least 30 respondents per subsample when dividing into groups.

For this study, the sample size of 167 library professionals, where 90 are from public, 73 are from private and 4 are from international universities. The respondent professionals comprise 23 librarians, 44 deputy librarians, 48 assistant librarians, 24 library officers, 20 assistant library officers, and 8 catalogers. Additionally, 439 users participated, consisting of 40 faculties, 8 PhD researchers, 10 MPhil researchers, 55 Master's students, and 318 honor's students. Among them, 214 are from public universities, 206 are from private universities, and 19 are from international universities. This sample size aligns with the recommendations of Krejcie and Morgan (1970), Sekaran and Bougie (2010), and Roscoe (1975), ensuring its suitability for the study.

### **3.4 Data collection tools**

To conduct the study, two sets of structured questions were created. To gather information about the libraries their functions, and IL activities of the chosen university libraries, questionnaire set-1 is created. Additionally, the purpose of Questionnaire Set 2 was to gather information from library users about their awareness, perceptions and satisfaction with IL and SDGs.

*Questionnaire set 1:* A structured printed questionnaire, incorporating both closed-ended and open-ended questions, is designed and distributed among university library professionals. The questionnaire comprises approximately 63 questions across four sections. *Section 1* gathered general information about the universities and libraries, including the institution and library name, establishment year, category, gender, designation, age group, job experience, and highest education level. *Section 2* focuses on the status of IL initiatives, covering aspects such as the duration of IL programs, available IL services, and user ratings of current IL initiatives. *Section 3* examines the relationship between UN SDGs and IL activities. It assesses awareness of SDGs, their importance in libraries, engagement levels, perceived impact on achieving SDGs, and IL's role in contributing to SDGs through services. Additionally, 40 statements are included under four key themes: promotion of information literacy, user engagement and knowledge sharing, institutional policy and support, and IL's contribution to achieving SDGs. Responses are recorded on a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The 5-point Likert scale was preferred for this study as it strikes a balance between simplicity and respondent transparency. It provides an adequate range to capture varying levels of perceptions and opinions, ranging from strongly disagree to strongly agree, without devastating the respondents with too various choices. Compared to 4-point or 7-point scales, the 5-point scale decreases burden, expands response levels, and confirms regularity among the different respondent groups, particularly in educational and library research circumstances. It also assists in easy coding and statistical analysis while maintaining the reliability and cogency of the tools. Finally, *Section 4* offers three open-ended questions on recommendations and best practices on IL and UN SDGs to find out insights from the library professionals.

*Questionnaire set 2:* A structured printed questionnaire is distributed among a diverse group of library users, including faculty, researchers, students, and other relevant individuals. The questionnaire comprises approximately 50 questions across six sections. *Section 1* collects demographic information such as university name, type of university, gender, types of users, age group, and frequency of library visits, which are included in the questionnaire set-2 that is created for the study. *Section 2* assesses the awareness, use, and level of satisfaction with IL services, *section 3* explores the impact of IL on academic and SDGs, *section 4* identifies challenges and obstacles

faced by users in accessing IL programs, *section 5* gathers the user perceptions of library support and services, along with identifying gaps in existing provisions, and *section 6* focuses on recommendations and best practices presenting six key statements as suggestions considering the 5 point-Likert scales from (1= Strongly disagree to 5= Strongly agree). Additionally, the section offers an open-ended question to provide recommendations for enhancing the role of libraries to achieve SDGs.

### **3.5 Pilot survey**

Before finalizing the questionnaires, a pilot survey was conducted among university library professionals and users from two selected university libraries: i) Dhaka University Library and ii) East West University Library. The pilot phase included 5 library professionals and 10 library users from each institution, totaling 10 professionals and 20 users. Since the responses were acceptable and only minor corrections were made to the questionnaire structure (e.g., wording and sequence), these responses were retained and included in the final data. This preliminary survey played a crucial role in refining the questionnaire, particularly in restructuring technical and domain-specific terms to enhance clarity and comprehension. Based on the feedback, reliability and validity analysis, some statements related to IL, professional perceptions, and user satisfaction were modified to justify the sequences and improve the questionnaire's effectiveness and cleanliness. No new statement was incorporated into the questionnaire.

### **3.6 Data collection techniques**

Information is gathered from 25 university libraries that were chosen. Primary sources of information were used to compile the conceptual and textual data for this study. Using a questionnaire, primary data were gathered from library professionals and users, such as faculty members, researchers, and students, during the researcher's visits to the chosen university libraries. A total of 201 survey questionnaires were circulated among library professionals like librarians, deputy librarians, assistant librarians and other library officials who were actively engaged in IL activities. Out of 201 questionnaires, 173 responses were obtained from them, with 6 missing or inaccurate responses. After careful assessment, 167 valid responses were acknowledged and analyzed, resulting in an overall response rate of 83.1%, as shown in Table 3.2.

**Table 3.2: Data distribution among the library professionals and response rate**

| Natl. Rank   | Name of the University                                                  | Distributed | Returned   | Response Rate % |
|--------------|-------------------------------------------------------------------------|-------------|------------|-----------------|
| 1            | University of Dhaka (DU)                                                | 35          | 31         | 88.6            |
| 2            | Bangladesh University of Engineering and Technology (BUET)              | 10          | 9          | 90.0            |
| 3            | North South University (NSU)                                            | 14          | 10         | 71.4            |
| 4            | BRAC University (BU)                                                    | 15          | 13         | 86.7            |
| 5            | Jahangirnagar University (JU)                                           | 7           | 5          | 71.4            |
| 6            | Dhaka University of Engineering and Technology, Gazipur (DUET)          | 3           | 2          | 66.7            |
| 7            | Daffodil International University (DIU)                                 | 10          | 7          | 70.0            |
| 8            | Shahjalal University of Science and Technology (SUST)                   | 10          | 8          | 80.0            |
| 9            | University of Rajshahi (RU)                                             | 6           | 5          | 83.3            |
| 10           | Chittagong University of Engineering and Technology (CUET)              | 5           | 5          | 100.0           |
| 11           | Islamic University of Technology (IUT)                                  | 4           | 4          | 100.0           |
| 12           | East West University (EWU)                                              | 14          | 12         | 85.7            |
| 13           | Khulna University of Engineering and Technology (KUET)                  | 5           | 3          | 60.0            |
| 14           | Rajshahi University of Engineering and Technology (RUET)                | 4           | 3          | 75.0            |
| 15           | Ahsanullah University of Science and Technology (AUST)                  | 3           | 3          | 100.0           |
| 16           | Stamford University Bangladesh (SUB)                                    | 3           | 2          | 66.7            |
| 17           | Jashore University of Science and Technology (JUST)                     | 7           | 5          | 71.4            |
| 18           | Independent University Bangladesh (IUB)                                 | 7           | 6          | 85.7            |
| 19           | Khulna University (KU)                                                  | 5           | 4          | 80.0            |
| 20           | United International University (UIU)                                   | 4           | 3          | 75.0            |
| 21           | International University of Business Agriculture and Technology (IUBAT) | 3           | 2          | 66.7            |
| 22           | University of Chittagong (CU)                                           | 10          | 10         | 100.0           |
| 23           | University of Asia Pacific, Bangladesh (UAPB)                           | 5           | 4          | 80.0            |
| 24           | American International University Bangladesh (AIUB)                     | 2           | 2          | 100.0           |
| 25           | University of Liberal Arts, Bangladesh (ULAB)                           | 10          | 9          | 90.0            |
| <b>Total</b> |                                                                         | <b>201</b>  | <b>167</b> | <b>83.1</b>     |

For this study, twenty five universities were selected based on their rankings in the 2024 QS Rank list for Bangladesh (QS World University Rankings, 2024). Table 3.2 presents data on the distribution of survey responses among library professionals from 25 universities in Bangladesh. A total of 201 survey questionnaires were circulated, of which 167 were acknowledged and analyzed, resulting in an overall response rate of 83.1%. Among the universities, Chittagong University of Engineering and

Technology (CUET), Islamic University of Technology (IUT), Ahsanullah University of Science and Technology (AUST), University of Chittagong (CU), and American International University Bangladesh (AIUB) achieved a 100.0% response rate, indicating full participation. Notably, Bangladesh University of Engineering and Technology (BUET) 90.0% and University of Liberal Arts Bangladesh (ULAB) 90.0% also have high response rates. In contrast, Khulna University of Engineering and Technology (KUET) 60.0% had the lowest response rate among the listed institutions. Overall, the high response rate suggests healthy assignment from library professionals, confirming a consistent dataset for analysis.

Additionally, a total of 500 copies of questionnaire Set-2 were distributed to faculties, PhD and MPhil researchers, and students within the libraries of the 25 selected universities. Out of these, 453 responses were received. After a thorough review, 14 responses were found to be incomplete or incorrectly filled and excluded from the analysis. Consequently, data from 439 valid responses were considered, resulting in an effective response rate of 88.0%. According to Mugenda and Mugenda (2003), 50 percent response rate is adequate, 60 percent is good, and above 70 percent rate very well. Therefore, the response rate of 88.0% is considered appropriate for determining the inferences regarding the research objectives (Table 3.3).

Table 3.3 presents the distribution of questionnaires and the response rates among library users from 25 universities in Bangladesh, selected based on their rankings in the 2024 QS World University Rankings. A total of 500 questionnaires were distributed across the chosen universities, with 439 responses are received and analyzed, resulting in an overall response rate of 88.0%. Several universities achieve a 100.0% response rate, including BUET, JU, EWU, IUB, and the UAPB. Other institutions, such as DU, CUET, IUT, and the CU, have response rates of 95.0%, reflecting strong participation. Conversely, universities like AUST 70.0% and AIUB 65.0% record the lowest response rates, indicating relatively lower engagement from their library users. The findings suggest that public and leading private universities have higher response rates, while some private institutions showed comparatively lower engagement. The high overall response rate 88.0% strengthens the reliability of the study, ensuring a broad representation of library user perspectives across top-ranked universities in Bangladesh.

**Table 3.3: Distribution of questionnaire and response rate (Users)**

| Natl. Rank   | Name of the University                                                  | Distributed | Returned   | Response Rate (%) |
|--------------|-------------------------------------------------------------------------|-------------|------------|-------------------|
| 1            | University of Dhaka (DU)                                                | 20          | 19         | 95.0              |
| 2            | Bangladesh University of Engineering and Technology (BUET)              | 20          | 20         | 100.0             |
| 3            | North South University (NSU)                                            | 20          | 18         | 90.0              |
| 4            | BRAC University (BU)                                                    | 20          | 17         | 85.0              |
| 5            | Jahangirnagar University (JU)                                           | 20          | 20         | 100.0             |
| 6            | Dhaka University of Engineering and Technology, Gazipur (DUET)          | 20          | 17         | 85.0              |
| 7            | Daffodil International University (DIU)                                 | 20          | 18         | 90.0              |
| 8            | Shahjalal University of Science and Technology (SUST)                   | 20          | 18         | 90.0              |
| 9            | University of Rajshahi (RU)                                             | 20          | 15         | 75.0              |
| 10           | Chittagong University of Engineering and Technology (CUET)              | 20          | 19         | 95.0              |
| 11           | Islamic University of Technology (IUT)                                  | 20          | 19         | 95.0              |
| 12           | East West University (EWU)                                              | 20          | 20         | 100.0             |
| 13           | Khulna University of Engineering and Technology (KUET)                  | 20          | 16         | 80.0              |
| 14           | Rajshahi University of Engineering and Technology (RUET)                | 20          | 15         | 75.0              |
| 15           | Ahsanullah University of Science and Technology (AUST)                  | 20          | 14         | 70.0              |
| 16           | Stamford University Bangladesh (SUB)                                    | 20          | 17         | 85.0              |
| 17           | Jashore University of Science and Technology (JUST)                     | 20          | 18         | 90.0              |
| 18           | Independent University Bangladesh (IUB)                                 | 20          | 20         | 100.0             |
| 19           | Khulna University (KU)                                                  | 20          | 18         | 90.0              |
| 20           | United International University (UIU)                                   | 20          | 15         | 75.0              |
| 21           | International University of Business Agriculture and Technology (IUBAT) | 20          | 16         | 80.0              |
| 22           | University of Chittagong (CU)                                           | 20          | 19         | 95.0              |
| 23           | University of Asia Pacific, Bangladesh (UAPB)                           | 20          | 20         | 100.0             |
| 24           | American International University Bangladesh (AIUB)                     | 20          | 14         | 70.0              |
| 25           | University of Liberal Arts, Bangladesh (ULAB)                           | 20          | 18         | 90.0              |
| <b>Total</b> |                                                                         | <b>500</b>  | <b>439</b> | <b>88.0</b>       |

### 3.7 Statistical methods

The collected survey data undergo quantitative and qualitative analysis using robust statistical methods to extract meaningful insights and trends. The quantitative analysis focuses on numerical assessments related to IL and SDGs in university libraries, while qualitative responses from open-ended questions were analyzed through

thematic analysis. This approach helps identify recurring themes, patterns, and perceptions, offering a comprehensive understanding of existing challenges and opportunities in IL promotion.

For quantitative analysis, SPSS is used to perform various statistical tests. Descriptive statistics, inferential tests, and hypothesis evaluation are carried out to ensure a data-driven approach to measuring IL awareness, user satisfaction, and the role of university libraries in supporting SDGs. ANOVA is applied to assess differences in awareness and satisfaction levels across various user categories and university types, thereby aligning the analysis with the study objectives and hypothesis testing.

To ensure the adequacy of the sample for factor analysis, the Kaiser-Meyer-Olkin (KMO) test is conducted, yielding a KMO value of 0.797, which indicates a sufficient sample size for analysis. Additionally, Bartlett's Test of Sphericity showed a statistically significant result ( $p = 0.000$ ), confirming that the dataset is appropriate for factor analysis. The reliability of the study instruments was assessed using Cronbach's Alpha in SPSS. A Cronbach's Alpha score of 0.872 and a standardized value of 0.916 for 40 items indicate high internal consistency and reliability of the questionnaire.

To establish the validity of this study, multiple statistical tests are performed, including factor analysis, scree plot examination, variance inflation factor (VIF) calculations, and convergent validity assessment through average variance extracted (AVE). Additionally, item loadings, commonalities, and collinearity statistics are examined to validate the structural integrity of the research model. These rigorous statistical methodologies ensured that the findings are both valid and reliable, strengthening the study's contribution to IL research in university libraries.

In this study, the data were collected from the users and analyzed to examine awareness, satisfaction, and perceptions of IL initiatives in relation to the SDGs. Both descriptive and inferential statistics were employed to interpret user responses collected through structured questionnaires. Descriptive statistics such as mean, standard deviation, skewness, and kurtosis were used to summarize user opinions. At the same time, ANOVA and correlation analyses helped to identify significant differences and relationships among user groups (e.g., university type and user

category). In addition, open-ended responses were thematically analyzed to capture qualitative insights regarding challenges, expectations, and suggestions for improving IL programs. This combined approach ensured a comprehensive understanding of user perspectives and their role in shaping effective IL initiatives for achieving SDGs.

### 3.8 Sampling adequacy, descriptive statistics and reliability

In order to assess the adequacy of the sampling procedure and to ensure the reliability of the data, the study employed several statistical methods, which are detailed below.

#### 3.8.1 Sampling adequacy

The study applies the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity to assess whether the sample size is sufficient for factor analysis.

##### 3.8.1.1 KMO and Bartlett's test

The KMO test evaluates the adequacy of the sample for factor analysis, with values interpreted as follows: 0.90s = marvelous, 0.80s = meritorious, 0.70s = middling, 0.60s = mediocre, 0.50s = miserable, and below 0.50 = unacceptable (Kaiser, 1974). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy is 0.797, indicating a good level of adequacy for factor analysis. Bartlett's Test of Sphericity is significant ( $p = 0.000$ ), meaning that the correlation matrix is not an identity matrix and factor analysis is appropriate (Table 3.4). These results validate that the dataset is well-suited for identifying underlying factors.

**Table 3.4: KMO and Bartlett's test<sup>a</sup>**

|                                                 |                    |          |
|-------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin measure of sampling adequacy |                    | .797     |
| Bartlett's test of sphericity                   | Approx. Chi-Square | 3069.171 |
|                                                 | df                 | 780      |
|                                                 | Sig.               | .000     |

<sup>a</sup> Based on correlations (*KMO* = Kaiser-Meyer-Olkin, *Sig.* = Significance)

The overall value of KMO is 0.797, which is greater than the threshold of 0.7, indicating the sample size is adequate for factor analysis.

### 3.8.2 Descriptive statistics

Descriptive statistics are utilized in this study to summarize and analyze the dataset, providing insights into the distribution, central tendency, and variability of responses. Measures such as mean, standard deviation, minimum, and maximum values are applied to evaluate participants' perceptions of IL initiatives. These statistical tools help in understanding overall trends and identifying key areas for improvement in library services (Table 3.5).

**Table 3.5: Descriptive statistics of the data model**

| Item                                                                                                 | N      | Min.   | Max.   | Mean   | SD     |
|------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|
|                                                                                                      | Stats. | Stats. | Stats. | Stats. | Stats. |
| The library can offer user orientation training programs                                             | 167    | 0      | 5      | 4.63   | .663   |
| The library can organize workshops and webinars on IL topics e.g. search, use online sources         | 167    | 2      | 5      | 4.45   | .682   |
| The library can offer training to help users to use the Internet and other digital tools effectively | 167    | 2      | 5      | 4.37   | .755   |
| Library can offer services about plagiarism and how to avoid it                                      | 167    | 2      | 5      | 4.46   | .692   |
| The library should have physical and digital resources, databases, and learning materials            | 166    | 3      | 5      | 4.41   | .643   |
| The library can offer online tutorials to teach information literacy skills                          | 167    | 2      | 5      | 4.29   | .669   |
| The library can offer personalized research assistance to help users find information.               | 167    | 1      | 5      | 4.15   | .765   |
| The library can collaborate with faculty members to promote IL in academic activities                | 167    | 3      | 5      | 4.28   | .637   |
| The library can encourage users to use online reference services                                     | 166    | 2      | 5      | 4.40   | .678   |
| The library colleagues can be enthusiastic about offering IL-related activities.                     | 166    | 2      | 5      | 4.25   | .719   |
| Participation in IL workshops or training sessions offered by the library                            | 167    | 3      | 5      | 4.43   | .644   |
| Motivation to use the library's IL resources                                                         | 167    | 2      | 5      | 4.29   | .755   |
| Provision of IL programs that meet learning needs                                                    | 167    | 3      | 5      | 4.22   | .653   |
| Application of IL skills from the library to routine operations                                      | 166    | 2      | 5      | 4.09   | .695   |
| Assistance in community involvement and initiatives                                                  | 166    | 1      | 43     | 4.37   | 3.107  |
| Sharing the IL skills with colleagues in everyday services                                           | 167    | 3      | 5      | 4.22   | .712   |
| Taking strategies to increase user participation in the IL initiatives                               | 167    | 3      | 5      | 4.09   | .701   |
| Taking user feedback to improve the effectiveness of IL programs                                     | 167    | 2      | 5      | 4.13   | .660   |
| Tracking user engagement through different activities                                                | 167    | 2      | 5      | 4.04   | .794   |
| Taking initiatives to promote user skills and higher study                                           | 167    | 1      | 5      | 4.13   | .780   |
| The university library policies influence the effectiveness of IL programs                           | 167    | 1      | 5      | 4.13   | .840   |
| The university library should have well funding policy to improve the quality of library resources   | 167    | 3      | 5      | 4.30   | .741   |

| Item                                                                                                                                    | N          | Min.   | Max.   | Mean   | SD     |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------|--------|--------|--------|--------|
|                                                                                                                                         | Stats.     | Stats. | Stats. | Stats. | Stats. |
| Institutional support affects library staff motivation and program outcomes                                                             | 167        | 2      | 5      | 4.16   | .703   |
| The financial constraints of the library impact the delivery and reach of IL initiatives                                                | 167        | 1      | 5      | 4.02   | .776   |
| The library adapts IL programs to address the diverse student needs                                                                     | 166        | 1      | 5      | 4.19   | .735   |
| The library should identify cultural and social barriers to adopting the IL in the activities                                           | 166        | 2      | 5      | 4.09   | .712   |
| The library can minimize the impact of the digital divide through IL skill development                                                  | 167        | 2      | 5      | 4.14   | .719   |
| The library's limited online resources influence the effectiveness of online IL resources                                               | 167        | 2      | 5      | 4.00   | .784   |
| The university's adequate support such as funding and budget need for library IL initiatives                                            | 167        | 2      | 5      | 4.22   | .715   |
| Collaboration between the library and the university administration, emphasizing a strategic approach to achieving SDG goals through IL | 166        | 2      | 5      | 4.25   | .709   |
| The university library IL programs work to reduce poverty by helping to get jobs SDG-1: No poverty                                      | 167        | 1      | 5      | 3.96   | .963   |
| IL programs work to end hunger by offering information ensuring SDG-2: Zero hunger                                                      | 167        | 1      | 5      | 3.78   | .886   |
| IL programs contribute to improving the quality of education (SDG-4)                                                                    | 167        | 2      | 5      | 4.26   | .736   |
| IL programs empower women and provide equal access to all to ensure SDG 5: Gender equality                                              | 167        | 2      | 5      | 4.09   | .666   |
| IL skills help to achieve career development or job-seeking activities ensuring SDG-8: Decent work and economic growth                  | 167        | 2      | 5      | 4.19   | .719   |
| IL programs address the social and digital inequality-related issues to ensure SDG 10: Reduced inequality                               | 166        | 2      | 5      | 4.07   | .772   |
| IL programs collaborate with departments and other offices of the university to ensure SDG 17: Partnerships for the Goals               | 167        | 2      | 5      | 4.17   | .694   |
| IL programs promote sustainable practices among students, supporting SDG 12: Responsible Consumption and Production                     | 167        | 1      | 5      | 3.95   | .759   |
| IL programs support health and well-being by providing resources on health literacy, supporting SDG 3: Good Health and Well-being       | 167        | 1      | 5      | 4.01   | .720   |
| IL programs raise awareness on climate-related information to encourage action, supporting SDG 13: Climate Action                       | 167        | 1      | 5      | 3.96   | .864   |
| <b>Valid N (listwise)</b>                                                                                                               | <b>167</b> |        |        |        |        |

### 3.8.3 Data normality test

To examine the distribution of professionals' responses, both the Kolmogorov–Smirnov and Shapiro–Wilk normality tests were performed across gender groups. The results revealed that the data on Promoting IL ( $p = .053$ ) and Contribution ( $p = .119$ ) for female respondents were not statistically significant, suggesting approximate

normality. However, *User Engagement and Knowledge-sharing* ( $p = .001$ ) and *Institutional Policy and Supports* ( $p = .029$ ) showed significant values, indicating some departure from normality. In contrast, the male respondents' data across all variables produced significant results ( $p < 0.05$ ), indicating non-normal distributions. These findings suggest that while a few variables among female respondents approximate normality, the overall data set especially for male professionals deviates from the normality assumption. Therefore, subsequent analyses were conducted considering these deviations, ensuring robustness through appropriate parametric tests supplemented by non-parametric checks where necessary.

**Table 3.6: Tests of normality of professionals' data**

| Dependent Variables                   | Gender | Kolmogorov-Smirnov <sup>a</sup> |     |       | Shapiro-Wilk |     |      |
|---------------------------------------|--------|---------------------------------|-----|-------|--------------|-----|------|
|                                       |        | Statistic                       | df  | Sig.  | Statistic    | df  | Sig. |
| Promoting IL                          | Female | .100                            | 59  | .200* | .960         | 59  | .053 |
|                                       | Male   | .191                            | 108 | .000  | .900         | 108 | .000 |
| User Engagement and Knowledge-sharing | Female | .202                            | 59  | .000  | .917         | 59  | .001 |
|                                       | Male   | .121                            | 108 | .001  | .863         | 108 | .000 |
| Institutional Policy and Supports     | Female | .129                            | 59  | .016  | .955         | 59  | .029 |
|                                       | Male   | .084                            | 108 | .057  | .975         | 108 | .036 |
| Contribution                          | Female | .157                            | 59  | .001  | .968         | 59  | .119 |
|                                       | Male   | .127                            | 108 | .000  | .950         | 108 | .001 |

\*This is a lower bound of the true significance. <sup>a</sup>Lilliefors Significance Correction

### 3.8.4 Mann-Whitney test

The Mann-Whitney U test was conducted to examine whether there were gender-based differences in library visitation frequency. The results show a statistically significant difference between female and male respondents ( $p < .001$ ). The mean rank for females (254.64) was higher than for males (192.06), indicating that female respondents visit the library more frequently than their male counterparts.

### 3.8.5 Kruskal-Wallis test

A Kruskal-Wallis test was applied to compare satisfaction with IL initiatives across different university categories since the data did not meet normality assumptions. The analysis revealed a statistically significant difference in satisfaction levels among public, private, and international universities ( $\chi^2 = 8.424$ ,  $df = 2$ ,  $p = .015$ ). The mean ranks indicate that public (222.99) and private (224.47) universities showed relatively higher satisfaction compared to international universities (137.87).

### 3.8.6 Reliability

To assess the reliability of the data, three key measures Cronbach's Alpha coefficient, RHO\_A, and composite reliability are utilized. Among them, Cronbach's Alpha coefficient metric is used to evaluate the internal consistency of the data, ensuring that the variables are measured accurately and reliably throughout the study.

#### 3.8.6.1 Cronbach's Alpha

Cronbach's Alpha is a widely used metric for evaluating the internal consistency of a dataset, with values ranging from 0 to 1, where a higher value indicates greater reliability. A threshold of 0.70 or higher is generally considered acceptable for research (Sijtsma, 2009; Vaske *et al.*, 2016). As shown in Table 3.7, the internal consistency for the 40 items in this study is high ( $\alpha = 0.872$ ), demonstrating excellent reliability. Furthermore, Cronbach's Alpha based on standardized items ( $\alpha = 0.916$ ) further reinforces the robustness of the dataset. These findings confirm that the questionnaire items exhibit strong reliability, ensuring consistency in measuring the intended constructs and reducing the likelihood of measurement errors.

**Table 3.7: Reliability statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | No. of Items |
|------------------|----------------------------------------------|--------------|
| .872             | .916                                         | 40           |

### 3.8.7 Validity

To assess the sampling adequacy and reliability, various statistical techniques are applied to validate the model. These methods include factor analysis, Scree Plot, item loadings, and commonalities. Each of these tests contributes to ensuring the robustness and validity of the model used in the study.

#### 3.8.7.1 Factor analysis

The purpose of factor analysis is to determine if the measures on the chosen constructs are loaded as predictable. The total variance explained by the table presents the Principal Component Analysis (PCA) results, showing how much variance each extracted component accounts for in the dataset. The first four components have eigenvalues greater than 1, explaining 60.642% of the total variance, indicating their

significance in representing the data structure. After rotation, the variance is more evenly distributed, with the first four components still contributing the most, confirming that a four-factor solution is appropriate for further analysis. This distribution suggests that the factors are well-defined and distinct, making them suitable for inclusion in a path model.

### 3.8.7.2 Scree Plot

The Scree Plot validates the factor analysis by illustrating the eigenvalues of the components. The steep decline in eigenvalues from Component 1 to Component 4 suggests that these four factors explain most of the variance, supporting the selection of a four-factor solution. After the fourth component, the curve flattens, indicating that additional components contribute minimal variance and should not be retained. This confirms that extracting four factors is appropriate for the study (Figure 3.2).

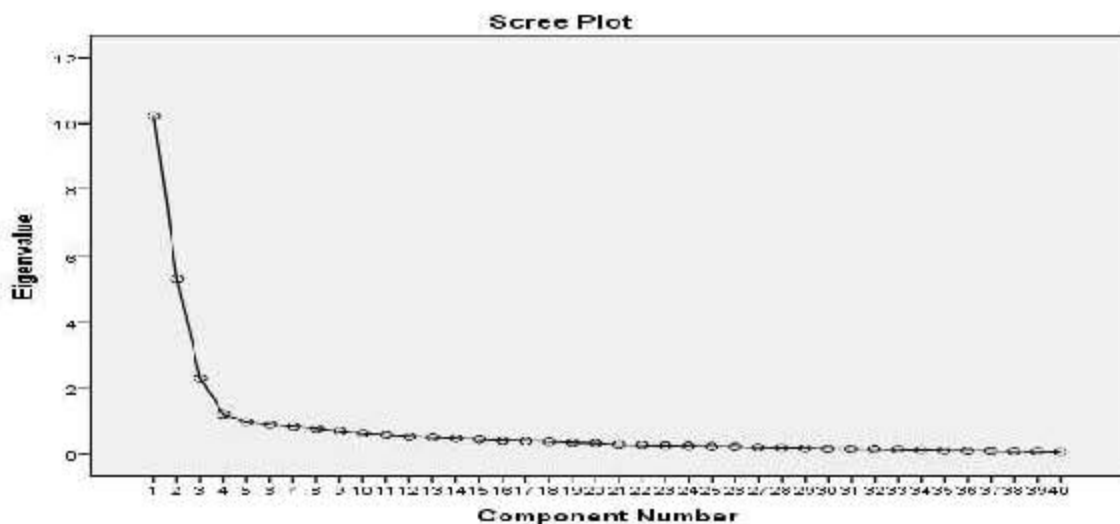


Figure 3.2: Scree Plot test

## 3.9 Mapping research questions with research hypothesis and research design, and the sections where the result is addressed

Table 3.8 provides a structured mapping of the study's key research questions (RQs) to their corresponding research hypotheses, data collection strategies, instruments, analysis techniques, and the chapters where the results are reported. It ensures coherence between the study's objectives and methodological execution while guiding the reader to locate specific findings and analyses throughout the dissertation.

**Table 3.8: Mapping RQ with research hypotheses, design, and results**

| RQ                                                                                                                                                            | Hypotheses                                                                                                                                                                                    | Research Design                        |                                            |                                                          | Result to be found                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                                                                                                               |                                                                                                                                                                                               | Data Collection                        | Tools                                      | Data Analysis                                            |                                                                                     |
| What is the current status of IL initiatives in university libraries of Bangladesh? (RQ1)                                                                     | There is an impact of uniform IL initiative in university libraries of Bangladesh on achieving SDGs. (H1)                                                                                     | The survey questionnaire               | Printed survey questionnaire set-1         | Descriptive statistics                                   | Chapters 4 & 5 (Status of IL initiatives in university libraries)                   |
| How does IL relate to the achievement of the UN SDGs? (RQ2)                                                                                                   | There is a relationship between promotion of IL and the progress SDGs. (H2)                                                                                                                   | The survey questionnaire               | Printed survey questionnaire set-1         | Descriptive statistics, Correlation, Regression analysis | Chapters 4 & 5 (Relation-ship between IL and SDGs)                                  |
| What strategic factors can be employed by university libraries in Bangladesh to promote IL for achieving the SDGs? (RQ3)                                      | There are key factors of IL such as user engagement and skill development, digital literacy training, environmental well-being, and financial support that contribute to achieving SDGs. (H3) | The survey questionnaire               | Printed survey questionnaire set 1         | Factor analysis, descriptive statistics                  | Chapters 4 & 5 (Factors influencing the promotion of IL for SDGs)                   |
| What are the perceptions, levels of awareness, and satisfaction with the IL program among university library users? (RQ4)                                     | There is a relationship between the level of awareness and satisfaction regarding IL initiatives among different universities and user categories. (H4)                                       | The survey questionnaire               | Printed survey & questionnaire set 2       | ANOVA, Mean analysis                                     | Chapters 4 & 5 (User perception, awareness, and satisfaction)                       |
| What impacts, challenges and obstacles do university libraries in Bangladesh face in implementing IL programs aimed to achieve the SDGs? (RQ5)                | There is a positive impact of IL programs on achieving SDGs. (H5)                                                                                                                             | The survey questionnaire               | Printed survey questionnaire set 1 & 2     | Thematic coding, Frequency distribution                  | Chapters 4, 5 & 6 (Thematic analysis, Recommendations & Future research directions) |
| What recommendations and the best practices can be proposed for university libraries to enhance their role in promoting IL for sustainable development? (RQ6) | There are limitations such as inadequate funding, lack of awareness, and insufficient infrastructural support that hinder IL activities from attaining SDGs. (H6)                             | Synthesis of survey and Open responses | Printed survey and questionnaire set 1 & 2 | Triangulated thematic analysis, Best practice extraction | Chapters 4, 5 and 6                                                                 |

### **3.10 Ethical considerations**

Ethical considerations are carefully upheld throughout the research process to ensure integrity, transparency, and respect for participants' rights. Informed consent is obtained from all participants before data collection, ensuring that they are fully aware of the study's purpose, procedures, and their right to withdraw at any stage without consequences. Additionally, strict measures are taken to safeguard participants' privacy and anonymity, with all responses kept confidential and used solely for research purposes.

The study adheres to established ethical guidelines and principles for conducting surveys, including fairness, non-coercion, and accuracy in data representation. To further uphold ethical standards, formal ethical approval is sought from the respective university libraries before initiating data collection. By maintaining these ethical safeguards, the study ensures compliance with research integrity standards while fostering trust and credibility in the research findings.

### **3.11 Participant selection**

The researcher selects the following respondents for the study.

*Library Administrators and library professionals:*

- a) Heads of university libraries in selected university libraries of Bangladesh.
- b) Senior library professionals are responsible for overseeing IL initiatives.

*University library users:*

- a) Regular and irregular university library users who represent a diverse range of demographics, including faculty members, students, professionals, and researchers.

### **3.12 Research prospects**

The research is expected to contribute to understanding the factors that influence the adoption and implementation of IL activities in selected university libraries in Bangladesh. The study provides insights into the perceptions, attitudes, and behaviors of librarians and library users regarding IL activities, which can inform the development and delivery of quality library services in the country. The research identifies the challenges and opportunities associated with the IL in university

libraries in Bangladesh, which can inform the development of strategies and policies to support the IL activities in the country. The research findings can be used by librarians, library managers, and policymakers in Bangladesh to develop IL promotional activities that meet the community's needs and ensure the sustainable development of the country. The research findings can also inform and influence the decisions of other libraries, organizations, or government bodies with similar challenges and objectives.

### **3.13 Chapter summary**

In summary, the research is expected to significantly impact the IL of selected university libraries in Bangladesh by providing a better understanding of the factors that influence the adoption and implementation of IL promotional activities and by identifying the challenges and opportunities associated with the IL in achieving SDGs. This chapter has comprehensively detailed the research methodology adopted for the study, ensuring a systematic and rigorous approach to data collection and analysis. By employing a structured questionnaire and applying statistical methods such as descriptive analysis, reliability testing, and inferential techniques, the study maintains methodological robustness. Ethical considerations are also prioritized to uphold participant rights and data integrity. The subsequent chapters present and analyze the findings derived from this methodological framework, providing valuable insights into the relationship between knowledge, leadership quality, and user satisfaction in academic libraries.

**CHAPTER FOUR**  
**DATA ANALYSIS**

## **CHAPTER FOUR: DATA ANALYSIS**

### **4.1 Introduction**

This chapter explores the analysis and understanding of the gathered data to realize the challenges, and effectiveness of Information Literacy (IL) programs. The study assesses the current status of IL initiatives, the relationship between IL and United Nations Sustainable Development Goals (UN SDGs), factor analysis, and recommendations and best practices, along with thematic analysis based on library administrators' insights. Furthermore, the study examines the awareness and level of satisfaction with IL services, the impact of IL on academic and Sustainable Development Goals (SDG), challenges and obstacles, enhancing the accessibility and effectiveness of IL programs, perception of library support, additional services or resources for enhancing IL skills, gaps in library resources for promoting IL programs aligned with SDGs, perceived effectiveness of IL strategies for achieving SDGs in university libraries of Bangladesh regarding the users' point of views.

The study identifies key facets such as resource availability, institutional support, student and faculty engagement, technological barriers, and the overall effectiveness of IL initiatives. Responses from participants provide valuable insights into the existing limitations and areas for improvement. By examining these factors, this chapter aims to identify patterns, trends, and critical issues that influence the success of IL programs, ultimately offering a foundation for recommendations and future enhancements.

### **4.2 Data analysis (Library professionals)**

#### **4.2.1 Demographic information of the respondents**

The demographic data of the 167 respondents reveal that the majority 53.9% are from public universities, followed by private universities 43.7%, while only 2.4% represent international universities. Among the respondents, 64.7% are male and 35.3% are female, highlighting a noticeable gender imbalance in the representation of library

professionals, with males significantly outnumbering females in library administration roles. Regarding job roles, assistant librarians 28.7% form the largest group, followed by deputy librarians 26.3%, while librarians, library officers, assistant library officers, and cataloguers comprise the rest. The 31-40 years age group constitutes the largest segment at 40.1%, followed by 25.7% in the 41-45 years range, indicating that the majority of library professionals are in their mid-career stage, reflecting a relatively experienced and mature workforce. Only a small percentage are either under 25 years 1.2% or above 56 years 1.8%, highlighting a relatively young but experienced professional base in university libraries (Table 4.1).

**Table 4.1: Demographic information of the professional respondents ( $n=167$ )**

| University category       | Frequency | Percent | Cumulative % |
|---------------------------|-----------|---------|--------------|
| Public                    | 90        | 53.9    | 53.9         |
| Private                   | 73        | 43.7    | 97.6         |
| International             | 4         | 2.4     | 100.0        |
| <b>Gender</b>             |           |         |              |
| Female                    | 59        | 35.3    | 35.3         |
| Male                      | 108       | 64.7    | 100.0        |
| <b>Designation</b>        |           |         |              |
| Librarian                 | 23        | 13.8    | 13.8         |
| Deputy Librarian          | 44        | 26.3    | 40.1         |
| Assistant Librarian       | 48        | 28.7    | 68.9         |
| Library Officer           | 24        | 14.4    | 83.2         |
| Assistant Library Officer | 20        | 12.0    | 95.2         |
| Cataloguer                | 8         | 4.8     | 100.0        |
| <b>Age group</b>          |           |         |              |
| Under 25 years            | 2         | 1.2     | 1.2          |
| 26-30 years               | 20        | 12.0    | 13.2         |
| 31-40 years               | 67        | 40.1    | 53.3         |
| 41-45 years               | 43        | 25.7    | 79.0         |
| 46-50 years               | 18        | 10.8    | 89.8         |
| 51-55 years               | 14        | 8.4     | 98.2         |
| 56 years and above years  | 3         | 1.8     | 100.0        |

#### 4.2.2 Job experience

Table 4.2 shows the job experience data indicate that the largest group of respondents 30.5% has 11-15 years, followed by those with 6-10 years 23.3% and 16-20 years 23.4%, reflecting a well-experienced workforce. Additionally, 16.8% of respondents

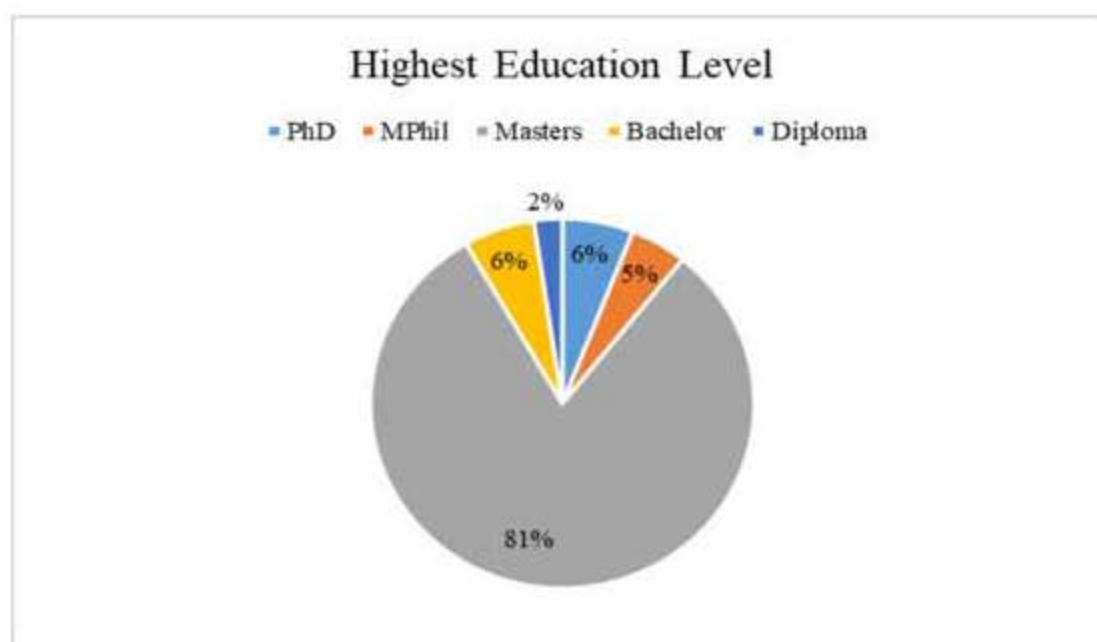
have more than 21 years of experience, while only 6.0% have less than 5 years, suggesting that most library professionals have substantial experience in the field.

**Table 4.2: Job experience of library professionals**

|                    | Frequency | Percent | Cumulative % |
|--------------------|-----------|---------|--------------|
| Less than 5 years  | 10        | 6.0     | 6.0          |
| 6-10 years         | 39        | 23.3    | 29.3         |
| 11-15 years        | 51        | 30.5    | 59.8         |
| 16-20 years        | 39        | 23.4    | 83.2         |
| More than 21 years | 28        | 16.8    | 100.0        |
| Total              | 167       | 100.0   |              |

#### 4.2.3 Highest level of education

The majority of respondents 80.8% hold a master's degree, indicating a high level of academic qualification among library professionals. A smaller proportion of the population has obtained a PhD 6.0% or MPhil 4.8%, reflecting advanced research qualifications. Additionally, 6.0% possess a bachelor's degree, while 2.4% have a diploma, suggesting that a limited number of professionals have only undergraduate or diploma-level education (Figure 4.1).



**Figure 4.1 : Highest education level of the library administrators ( $n=167$ )**

#### 4.2.4 Assessment of the current status of IL initiatives

##### 4.2.4.1 Descriptive statistics of IL initiative on SDGs

Table 4.3 presents descriptive statistics on five variables derived from Likert-scale responses collected from 167 library professionals regarding the implementation and consistency of IL initiatives in their libraries. In duration of IL Programs:  $Mean = 4.36$ ;  $SD = 0.933$ ;  $Skewness = -1.408$ . This indicates that IL programs have been in place for a considerable period in most university libraries. The high mean and negative skew suggest responses are concentrated toward longer durations, implying the existence of IL practices. In Current Status of IL Initiatives:  $Mean = 4.07$ ;  $SD = 0.858$ ;  $Skewness = -0.706$ . Respondents generally rated their IL programs positively, suggesting satisfaction with their quality or execution. In Uniformity of IL Initiatives:  $Mean = 2.96$ ;  $SD = 0.944$ ;  $Skewness = 0.159$ . The mean is close to the neutral midpoint (3), showing mixed perceptions and indicating a lack of clear uniformity in IL implementation across universities. In Variation between Public and Private Universities:  $Mean = 3.23$ ;  $SD = 0.878$ . Respondents slightly agree that IL initiatives vary between public and private institutions, reinforcing the perception of inconsistent practices across sectors. In Standardized IL Program Structure:  $Mean = 3.13$ ;  $SD = 0.922$ . The moderate mean indicates uncertainty or weak agreement about the existence of a standardized IL structure at the national or institutional level.

**Table 4.3: Descriptive statistics on IL initiative**

|                                                                                  | N         | Min       | Max       | Mean      | SD        | Skewness  | Kurtosis   |           |            |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|------------|
|                                                                                  | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| How long has the IL program been in place in your library?                       | 167       | 1         | 5         | 4.36      | .933      | -1.40     | .188       | 1.372     | .374       |
| How would you rate the current Information Literacy initiatives in your library? | 167       | 1         | 5         | 4.07      | .858      | -.706     | .188       | .204      | .374       |
| How would you rate on uniformity of IL initiatives in the libraries?             | 167       | 1         | 5         | 2.96      | .944      | .159      | .188       | -.171     | .374       |

|                                                                                        | N         | Min       | Max       | Mean      | SD        | Skewness  |            | Kurtosis  |            |
|----------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|------------|
|                                                                                        | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| IL initiatives vary in public and private university libraries in Bangladesh.          | 167       | 1         | 5         | 3.23      | .878      | -.097     | .188       | -.312     | .374       |
| There is a standardized IL program structure in the university libraries of Bangladesh | 167       | 1         | 5         | 3.13      | .922      | .074      | .188       | -.408     | .375       |
| Valid N (listwise)                                                                     | 167       |           |           |           |           |           |            |           |            |

Table 4.4 summarizes responses on IL initiatives, showing a moderate overall mean of 3.55. This reflects varied perceptions, especially on the uniformity of IL practices. The variance is relatively consistent (avg. 0.82), suggesting general agreement among respondents. The data indicates that while IL efforts exist, their implementation lacks standardization across university libraries in Bangladesh.

**Table 4.4: Summary item statistics on IL initiative**

|                | Mean  | Min   | Max   | Range | Max./Min. | Variance | Items |
|----------------|-------|-------|-------|-------|-----------|----------|-------|
| Item Means     | 3.552 | 2.964 | 4.355 | 1.392 | 1.470     | .385     | 5     |
| Item Variances | .824  | .734  | .896  | .162  | 1.220     | .005     | 5     |

The ANOVA results on IL initiatives in university libraries of Bangladesh show a statistically significant variation among the items ( $F = 83.424$ ,  $p < .001$ ), indicating differing responses across the assessed aspects of IL initiatives. The grand mean of 3.55 reflects a moderate overall perception. The significant F-value confirms that respondents clearly differentiate between aspects such as duration, quality, and uniformity of IL initiatives (Table 4.5). This supports H1, justifying that there is a lack of uniform IL initiatives across university libraries in Bangladesh, reinforcing the need for a standardized framework to effectively promote IL in alignment with SDGs.

**Table 4.5: ANOVA on IL initiative in university libraries of Bangladesh**

|                   |               | Sum of Squares | df  | Mean Square | F      | Sig  |
|-------------------|---------------|----------------|-----|-------------|--------|------|
| Between           | People        | 174.072        | 165 | 1.055       |        |      |
| Within            | Between Items | 255.622        | 4   | 63.905      | 83.424 | .000 |
| People            | Residual      | 505.578        | 660 | .766        |        |      |
|                   | Total         | 761.200        | 664 | 1.146       |        |      |
| Total             |               | 935.272        | 829 | 1.128       |        |      |
| Grand Mean = 3.55 |               |                |     |             |        |      |

The Levene's test (Table 4.6) results indicate that the assumption of homogeneity of variances has been satisfied for all variables related to IL initiatives. The significance (Sig.) values for each item are greater than 0.05 (ranging from .177 to .813), which means the variances between groups are not significantly different. Therefore, the data meet the requirements for applying parametric tests such as ANOVA and t-tests. This suggests that comparisons made across groups regarding IL program duration, current initiatives, uniformity, variation between public and private universities, and standardized structures are statistically reliable.

**Table 4.6: Test of homogeneity of variances in IL initiatives**

|                                                                                        | Levene Statistic | df1 | df2 | Sig. |
|----------------------------------------------------------------------------------------|------------------|-----|-----|------|
| How long has the IL program been in place in your library?                             | 1.838            | 1   | 165 | .177 |
| How would you rate the current Information Literacy initiatives in your library?       | .400             | 1   | 165 | .528 |
| How would you rate the uniformity of IL initiatives in the libraries?                  | .056             | 1   | 165 | .813 |
| IL initiatives vary in public and private university libraries in Bangladesh.          | .468             | 1   | 165 | .495 |
| There is a standardized IL program structure in the university libraries of Bangladesh | .606             | 1   | 164 | .437 |

#### 4.2.4.2 IL activities in the libraries

The data reveal that workshops and seminars are the most commonly offered IL activities, and are provided by 83.8% of libraries. In-house training sessions are also widely available, offered by 72.5% of libraries. Instructions to teaching-learning materials 58.1% and printed guides and manuals 51.3% are also frequently used. About 50.6% of libraries provide instructions on theories and practice, while research trends programs 35.0% and IL-integrated course modules 37.5% are less common. The overall data strongly emphasizes interactive and instructional IL activities across libraries (Table 4.7).

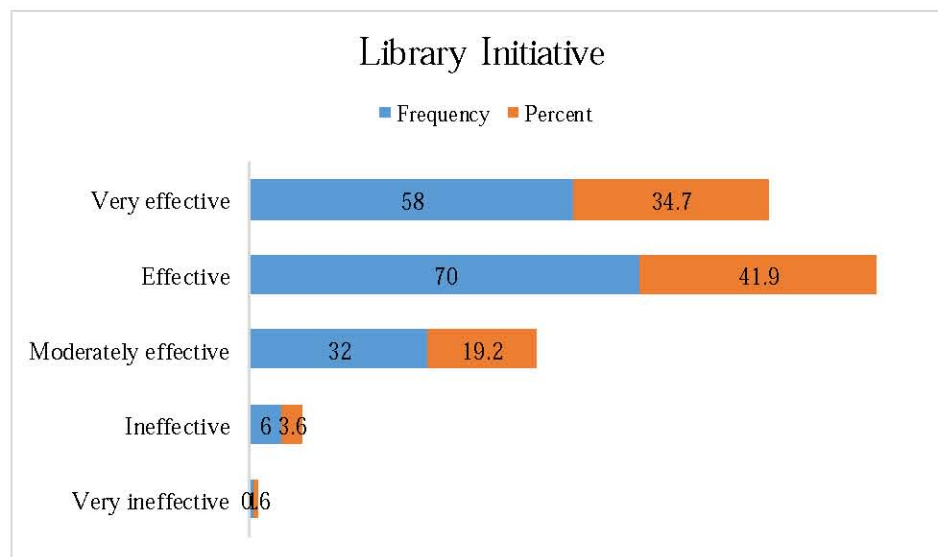
**Table 4.7: Frequencies of IL activities in the libraries**

|                         |                                             | Responses |         | % of Cases |
|-------------------------|---------------------------------------------|-----------|---------|------------|
|                         |                                             | N         | Percent |            |
| IL                      | Workshops and seminars                      | 134       | 21.6    | 83.8%      |
| Activities <sup>a</sup> | Instructions on theories and practice       | 81        | 13.0    | 50.6%      |
|                         | Organize research trends program            | 56        | 9.0     | 35.0%      |
|                         | In-house training sessions                  | 116       | 18.6    | 72.5%      |
|                         | IL-integrated course modules                | 60        | 9.6     | 37.5%      |
|                         | Printed guides and manuals                  | 82        | 13.2    | 51.3%      |
|                         | Instructions to teaching-learning materials | 93        | 15.0    | 58.1%      |
|                         | Total                                       |           | 622     | 100.0      |

<sup>a</sup>Dichotomy group tabulated at value 1

#### 4.2.4.3 Effectiveness of IL initiatives in the libraries

The majority of respondents rated their IL initiatives positively, with 41.9% considering them effective and 34.7% rating them as very effective. Meanwhile, 19.2% found them moderately effective, indicating room for improvement. A small proportion, 3.6%, perceived IL initiatives as ineffective, and only 0.6% found them very ineffective (Figure 4.2). These findings suggest that while IL programs are generally well-received, there is scope for further enhancement to maximize their impact.

**Figure 4.2: Rating of current IL initiatives in the library**

#### 4.2.4.4 Awareness towards UN SDGs

The data indicate that the majority of library professionals have strong awareness of the UN SDGs, with 36.5% being very aware and 25.7% being extremely aware. However, 19.2% remained neutral or uncertain, while 16.2% were somewhat aware. A small percentage 2.4% reported being not aware at all. These results suggest that while awareness is generally high, targeted efforts may be needed to enhance understanding and engagement with SDGs among all library professionals (Table 4.8).

**Table 4.8: Awareness towards UN SDGs**

|                   | Frequency | Percent | Cumulative % |
|-------------------|-----------|---------|--------------|
| Not aware at all  | 4         | 2.4     | 2.4          |
| Somewhat aware    | 27        | 16.2    | 18.6         |
| Neutral/Uncertain | 32        | 19.2    | 37.7         |
| Very aware        | 61        | 36.5    | 74.3         |
| Extremely aware   | 43        | 25.7    | 100.0        |
| Total             | 167       | 100.0   |              |

Table 4.9 presents the descriptive statistics on the awareness of library professionals towards the UN SDGs across different university categories. Overall, the mean awareness score is 3.67, indicating a moderate level of awareness among respondents. Private university professionals reported the highest mean score 3.89, followed by international 3.75 and public 3.49 university professionals. The standard deviations suggest some variability in responses, with international university professionals showing the highest variation 1.258, despite their small sample size. The confidence intervals indicate that private university professionals have higher awareness than their public counterparts. The awareness levels range from 1 to 5 across all groups, highlighting diverse familiarity levels among library professionals with SDGs.

**Table 4.9: Descriptive statistics regarding the awareness towards SDGs**

|         | N   | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Min. | Max. |
|---------|-----|------|----------------|------------|----------------------------------|-------------|------|------|
|         |     |      |                |            | Lower Bound                      | Upper Bound |      |      |
| Public  | 90  | 3.49 | 1.063          | .112       | 3.27                             | 3.71        | 1    | 5    |
| Private | 73  | 3.89 | 1.113          | .130       | 3.63                             | 4.15        | 1    | 5    |
| Intl.   | 4   | 3.75 | 1.258          | .629       | 1.75                             | 5.75        | 2    | 5    |
| Total   | 167 | 3.67 | 1.100          | .085       | 3.50                             | 3.84        | 1    | 5    |

The ANOVA examines whether there is a significant difference in awareness of the UN SDGs among library professionals across different university categories. The F-value of 1.881 and p-value of 0.116 indicate that the differences in mean awareness scores among public, private, and international university professionals are not statistically significant at the conventional 0.05 level. This suggests that while variations exist, they are not strong enough to conclude that the university category has a significant impact on SDG awareness among library professionals (Table 4.10).

**Table 4.10: ANOVA table between groups (University categories)**

|                               |                           | Sum of Squares | df  | Mean Square | F     | Sig. |
|-------------------------------|---------------------------|----------------|-----|-------------|-------|------|
| University Category *         | Between Groups (Combined) | 2.206          | 4   | .552        | 1.881 | .116 |
| How aware are you of UN SDGs? | Within Groups             | 47.506         | 163 | .291        |       |      |
| Total                         |                           | 49.713         | 167 |             |       |      |

## 4.2.5 Assessment of the relationship between IL and UN SDGs

### 4.2.5.1 Understanding of the SDGs

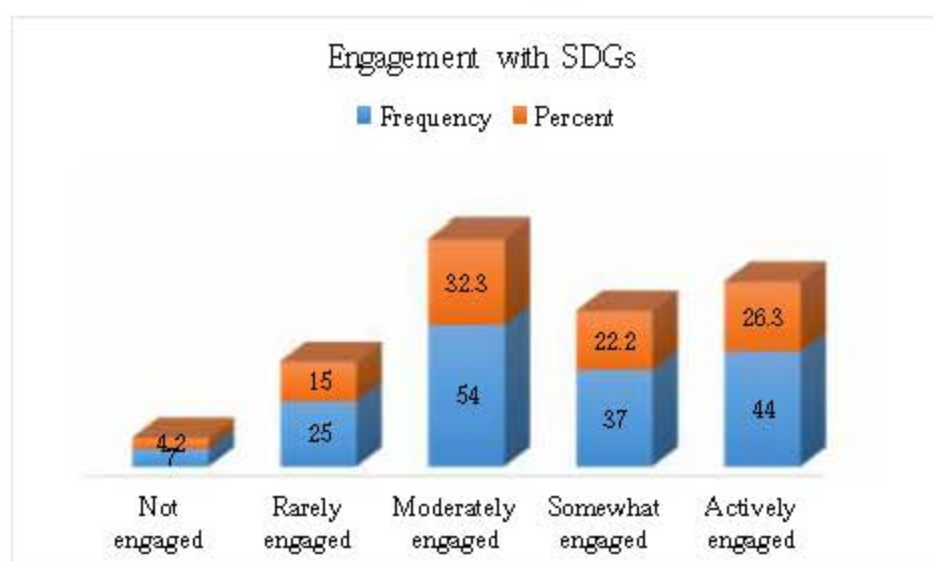
The findings reveal that the majority of library professionals recognize the significance of understanding the UN SDGs in their work. 58.6% consider it very important, while 23.4% regard it as extremely important. A smaller portion of 15.0% sees it as moderately important, and only 3.0% view it as slightly or not important at all. This highlights a strong institutional acknowledgement of the pivotal role libraries play in supporting SDG-related initiatives (Table 4.11).

**Table 4.11: Significance of understanding the UN SDGs in the library**

|                      | Frequency | Percent | Cumulative % |
|----------------------|-----------|---------|--------------|
| No important at all  | 1         | .6      | .6           |
| Slightly important   | 4         | 2.4     | 3.0          |
| Moderately important | 25        | 15.0    | 18.0         |
| Very important       | 98        | 58.6    | 76.6         |
| Extremely important  | 39        | 23.4    | 100.0        |
| Total                | 167       | 100.0   |              |

#### 4.2.5.2 Engagement with SDGs

The data illustrate varying levels of engagement with the UN SDGs among library professionals. While 26.3% report being actively engaged, a larger group 32.3% is moderately engaged, and 22.2% are somewhat engaged. However, 19.2% have minimal involvements, with 15.0% rarely engaged and 4.2% not engaged (Figure 4.3). These findings suggest that while many library professionals participate in SDG-related activities, there is room for increased engagement and awareness.

**Figure 4.3: Engagement of LIS professionals with SDGs through the IL program**

#### 4.2.5.3 Agreement about IL's impact on achieving SDGs

The data highlight strong agreement among library professionals regarding the impact of IL on achieving SDGs. A majority of 50.9% of respondents agree, while 35.3% strongly agree, indicating widespread recognition of IL's role in sustainable development. A smaller portion 12.6% is moderately in agreement, and only 1.2%

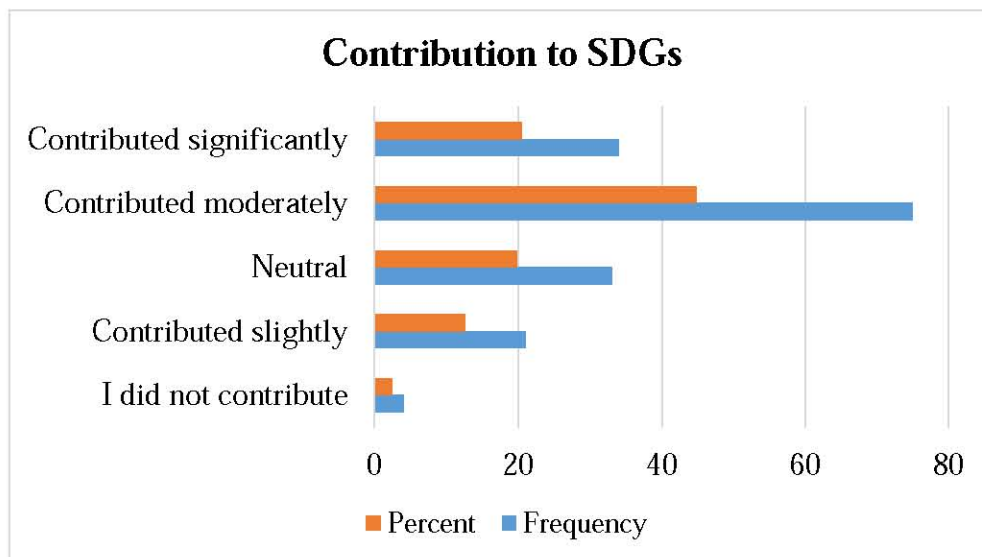
disagree (Table 4.12). This suggests that most library professionals acknowledge IL as a critical factor in advancing the UN SDGs.

**Table 4.12: IL’s Impact on achieving SDGs**

|                  | Frequency | Percent | Cumulative % |
|------------------|-----------|---------|--------------|
| Disagree         | 2         | 1.2     | 1.2          |
| Moderately agree | 21        | 12.6    | 13.8         |
| Agree            | 85        | 50.9    | 64.7         |
| Strongly agree   | 59        | 35.3    | 100.0        |
| Total            | 167       | 100.0   |              |

**4.2.5.4 Contribution to SDGs through services**

The data depict that most library professionals have contributed to the SDGs through their services, with 44.9% reporting moderate contributions and 20.4% indicating significant contributions. A smaller portion 12.6% has contributed slightly, while 19.8% remain neutral. Only 2.4% stated they had not contributed at all (Figure 4.4). This suggests that the majority of library professionals actively integrate SDG-related initiatives into their services, though there is room for increased engagement.



**Figure 4.4: Contribution to SDGs through services**

**4.2.5.5 Descriptive statistics on the relationship between IL initiatives and SDGs**

The descriptive statistics (Table 4.13) indicate that respondents show a strong awareness of the UN SDGs (M = 3.67) and consider it highly important for libraries to understand them (M = 4.02). While engagement with SDGs is moderate (M =

3.51), there is a high level of agreement regarding IL's impact on achieving the SDGs (M = 4.20). Respondents also reported a fair level of personal contribution to SDG-related services (M = 3.68). Overall, the findings suggest a positive perception of the relationship between IL and SDG progress, supporting RO2, RQ2, and H2.

**Table 4.13: Item statistics on the relationship between IL and UN SDGs**

| Items                                                        | Mean | SD    | N   |
|--------------------------------------------------------------|------|-------|-----|
| How aware are you of UN SDGs?                                | 3.67 | 1.100 | 167 |
| How important is it for your library to understand the SDGs? | 4.02 | .732  | 167 |
| How engaged are you with the SDGs?                           | 3.51 | 1.156 | 167 |
| How much do you agree about IL's impact on achieving SDGs?   | 4.20 | .699  | 167 |
| How much have you contributed to SDGs through your services? | 3.68 | 1.013 | 167 |

Table 4.14 presents aggregated statistics of five Likert-scale items assessing the connection between IL and the SDGs. The mean item score is 3.82, with individual means ranging from 3.52 to 4.20, indicating generally positive perceptions among respondents. The range of item means is 0.689, while the Max/Min ratio is 1.196, showing slight variability in perceptions across different items. The variance of items averages at 0.80, with item variances ranging from 0.49 to 1.34, indicating moderate consistency in responses. These statistics reflect a relatively strong and consistent agreement among participants about the relevance of IL in advancing the SDGs.

**Table 4.14: Summary item statistics on the relationship between IL and SDGs**

|                | Mean  | Min   | Max   | Range | Max/Min | Variance | Items |
|----------------|-------|-------|-------|-------|---------|----------|-------|
| Item Means     | 3.818 | 3.515 | 4.204 | .689  | 1.196   | .080     | 5     |
| Item Variances | .919  | .488  | 1.336 | .847  | 2.735   | .150     | 5     |

The ANOVA on the relationship between IL and SDGs reveals statistically significant differences in participant responses across the five survey items. The Between Items sum of squares is 53.528 with 4 degrees of freedom, producing a mean square of 13.382. The F-value is 27.085, and the p-value (Sig.) is .000, indicating a highly significant result at the 0.01 level. This means that the variation in responses among the different items is not due to chance, confirming that participants perceived the

relationship between IL and SDGs differently across various dimensions. With a grand mean of 3.82, the overall perception is positive, though the statistical significance suggests nuanced differences in awareness, importance, engagement, agreement, and contribution related to IL and the SDGs (Table 4.15).

**Table 4.15: ANOVA on the relationship between IL and SDGs**

|                   |               | Sum of Squares | df  | Mean Square | F      | Sig.         |
|-------------------|---------------|----------------|-----|-------------|--------|--------------|
| Between People    |               | 434.731        | 167 | 2.603       |        |              |
| Within            | Between Items | 53.528         | 4   | 13.382      | 27.085 | <b>.000*</b> |
| People            | Residual      | 328.072        | 664 | .494        |        |              |
| Total             |               | 381.600        | 668 | .571        |        |              |
| Total             |               | 816.331        | 834 | .979        |        |              |
| Grand Mean = 3.82 |               |                |     |             |        |              |

The results of Levene's test (Table 4.16) show that the assumption of homogeneity of variances is satisfied for most items related to the relationship between IL and the SDGs. For awareness, importance, engagement, and agreement about IL's impact, the significance (Sig.) values are greater than 0.05, confirming equal variances across groups. However, for the item *"How much have you contributed to SDGs through your services?"* the significant value is .014, which is below 0.05. This indicates unequal variances for this variable, suggesting that results related to contribution should be interpreted with caution or verified using non-parametric alternatives.

**Table 4.16: Test of homogeneity of variances in the relationship**

|                                                              | Levene    | df1 | df2 | Sig. |
|--------------------------------------------------------------|-----------|-----|-----|------|
|                                                              | Statistic |     |     |      |
| How aware are you of UN SDGs?                                | 1.516     | 1   | 165 | .220 |
| How important is it for your library to understand the SDGs? | .160      | 1   | 165 | .690 |
| How much engaged are you with SDGs?                          | .010      | 1   | 165 | .920 |
| How much do you agree about IL's impact on achieving SDGs?   | .007      | 1   | 165 | .933 |
| How much have you contributed to SDGs through your services? | 6.196     | 1   | 165 | .014 |

#### 4.2.5.6 Most impactful SDG

The findings indicate that SDGs goal 4 (Quality Education) is the highest-ranked SDG impacted by libraries, with 98.8% of respondents recognizing its significance. SDGs goal 5 (Gender Equality) ranks second with 48.5%, SDGs goal 17 (Partnerships for the Goals) ranks third with 38.9%, followed by SDGs goal 3 (Good Health and Well-being) at 38.3%.

At the same time, SDGs goal 1 (No Poverty) and SDGs goal 16 (Peace, Justice, and Strong Institutions) share the fifth position at 35.9%. Other notable contributions include SDGs goal 6 (Clean Water and Sanitation) at 35.3%, SDGs goal 8 (Decent Work and Economic Growth) at 32.3%, and SDGs goal 11 (Sustainable Cities and Communities) at 28.7% (Table 4.17). The data highlight libraries' central role in promoting education, collaboration, and societal well-being, reinforcing their impact on sustainable development.

**Table 4.17: Most impactful SDG in library frequencies**

|                                                       |                                                 | Responses |      | % of Cases |
|-------------------------------------------------------|-------------------------------------------------|-----------|------|------------|
|                                                       |                                                 | N         | %    |            |
| Which SDGs are most impacted in library? <sup>a</sup> | SDG 1: No Poverty                               | 60        | 6.3  | 35.9%      |
|                                                       | SDG 2: Zero Hunger                              | 46        | 4.8  | 27.5%      |
|                                                       | SDG 3: Good Health and Well-being               | 64        | 6.7  | 38.3%      |
|                                                       | SDG 4: Quality Education                        | 165       | 17.4 | 98.8%      |
|                                                       | SDG 5: Gender Equality                          | 81        | 8.5  | 48.5%      |
|                                                       | SDG 6: Clean Water and Sanitation               | 59        | 6.2  | 35.3%      |
|                                                       | SDG 7: Affordable and Clean Energy              | 23        | 2.4  | 13.8%      |
|                                                       | SDG 8: Decent Work and Economic Growth          | 54        | 5.7  | 32.3%      |
|                                                       | SDG 9: Industry, Innovation, and Infrastructure | 43        | 4.5  | 25.7%      |
|                                                       | SDG 10: Reduced Inequality                      | 45        | 4.8  | 26.9%      |
|                                                       | SDG 11: Sustainable Cities and Communities      | 48        | 5.1  | 28.7%      |
|                                                       | SDG 12: Responsible Consumption and Production  | 24        | 2.5  | 14.4%      |
|                                                       | SDG 13: Climate Action                          | 47        | 4.9  | 28.1%      |
|                                                       | SDG 14: Life Below Water                        | 31        | 3.4  | 18.6%      |
|                                                       | SDG 15: Life on Land                            | 35        | 3.7  | 21.0%      |
|                                                       | SDG 16: Peace, Justice, and Strong Institutions | 60        | 6.3  | 35.9%      |
|                                                       | SDG 17: Partnerships for the Goals              | 65        | 6.8  | 38.9%      |
| Total                                                 |                                                 | 950       | 100  | 568.9%     |

<sup>a</sup>Dichotomy group tabulated at value 1

## 4.2.6 Strategic factors to promote IL for achieving the SDGs

### 4.2.6.1 Factor analysis (Overall)

Factors can be followed to promote IL for achieving SDGs, facilitate user engagement and knowledge-sharing, establish institutional policy and support, and achieve SDGs through an IL program.

### 4.2.6.2 KMO and Bartlett's test

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy is 0.797, indicating a good level of adequacy for factor analysis. Bartlett's Test of Sphericity is significant ( $p = 0.000$ ), meaning that the correlation matrix is not an identity matrix, and factor analysis is appropriate. These results confirm that the data set is well-suited for identifying underlying factors (Table 4.18).

**Table 4.18: KMO and Bartlett's test<sup>a</sup>**

|                                                  |                    |          |
|--------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | .797     |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square | 3069.171 |
|                                                  | df                 | 780      |
|                                                  | Sig.               | .000     |

<sup>a</sup>Based on correlations

### 4.2.6.3 The communalities

Table 4.19 shows how much of each variable's variance is explained by the extracted factors. Higher extraction values indicate stronger relationships with the underlying factors. Key findings include:

*Strongest Contributions:* IL programs addressing SDGs goal 1: No Poverty (0.741), IL programs for Zero Hunger (SDGs goal 2) (0.609), and IL awareness on Climate Action (SDGs goal 13) (0.562) have the highest extraction values, suggesting they are well-represented by the factors.

*Moderate Contributions:* Training on digital tools (0.686), personalized research assistance (0.542), and tracking user engagement (0.478) also show relatively high communalities.

*Weakest Contributions:* Institutional and financial factors, such as financial constraints on IL programs (0.141), library adaptation for diverse needs (0.152), and collaborations for SDGs (0.311), have the lowest extraction values, indicating limited factor representation.

This analysis highlights that practical IL activities and SDG-focused initiatives are better captured by the extracted factors, while structural and financial challenges have weaker representation.

**Table 4.19: Communalities**

| No. | Factors                                                                                              | Raw     |            | Rescaled |            |
|-----|------------------------------------------------------------------------------------------------------|---------|------------|----------|------------|
|     |                                                                                                      | Initial | Extraction | Initial  | Extraction |
| 1   | The library can offer user orientation training programs                                             | .454    | .150       | 1.000    | .332       |
| 2   | The library can organize workshops and webinars on IL topics e.g. search, use online sources         | .466    | .219       | 1.000    | .471       |
| 3   | The library can offer training to help users to use the Internet and other digital tools effectively | .576    | .395       | 1.000    | .686       |
| 4   | Library can offer services about plagiarism and how to avoid it                                      | .479    | .243       | 1.000    | .508       |
| 5   | The library should have physical and digital resources, databases, and learning materials            | .420    | .208       | 1.000    | .497       |
| 6   | The library can offer online tutorials to teach information literacy skills                          | .451    | .200       | 1.000    | .444       |
| 7   | The library can offer personalized research assistance to help users find information.               | .605    | .328       | 1.000    | .542       |
| 8   | The library can collaborate with faculty members to promote IL in academic activities                | .410    | .117       | 1.000    | .286       |
| 9   | The library can encourage users to use online reference services                                     | .458    | .243       | 1.000    | .531       |
| 10  | The library colleagues can be enthusiastic about offering IL-related activities                      | .518    | .236       | 1.000    | .455       |
| 11  | Participation in IL workshops or training sessions offered by the library                            | .422    | .218       | 1.000    | .517       |
| 12  | Motivation to use the library's IL resources                                                         | .572    | .289       | 1.000    | .506       |
| 13  | Provision of IL programs that meet learning needs                                                    | .434    | .153       | 1.000    | .353       |
| 14  | Application of IL skills from the library to routine operations                                      | .486    | .181       | 1.000    | .373       |
| 15  | Assistance in community involvement and initiatives                                                  | 10.135  | 10.130     | 1.000    | .999       |
| 16  | Sharing the IL skills with colleagues in everyday services                                           | .515    | .225       | 1.000    | .437       |
| 17  | Taking strategies to increase user participation in the IL initiatives                               | .480    | .155       | 1.000    | .324       |
| 18  | Taking user feedback to improve the effectiveness of IL programs                                     | .438    | .198       | 1.000    | .453       |
| 19  | Tracking user engagement through different activities                                                | .637    | .305       | 1.000    | .478       |
| 20  | Taking initiatives to promote user skills and higher study                                           | .629    | .372       | 1.000    | .591       |
| 21  | The university library policies influence the effectiveness of IL programs                           | .708    | .370       | 1.000    | .523       |
| 22  | The university library should have well funding policy to improve the quality of library resources   | .554    | .186       | 1.000    | .336       |
| 23  | Institutional support affects library staff motivation and program outcomes                          | .486    | .115       | 1.000    | .237       |
| 24  | The financial constraints of the library impact the delivery and reach of IL initiatives             | .611    | .086       | 1.000    | .141       |
| 25  | The library adapts IL programs to address the diverse student needs                                  | .558    | .085       | 1.000    | .152       |
| 26  | The library should identify cultural and social barriers to adopting the IL in the activities        | .527    | .175       | 1.000    | .332       |

| No. | Factors                                                                                                                                 | Raw     |            | Rescaled |            |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------|---------|------------|----------|------------|
|     |                                                                                                                                         | Initial | Extraction | Initial  | Extraction |
| 27  | The library can minimize the impact of the digital divide through IL skill development                                                  | .532    | .113       | 1.000    | .212       |
| 28  | The library's limited online resources influence the effectiveness of online IL resources                                               | .624    | .198       | 1.000    | .318       |
| 29  | The university's adequate support such as funding and budget need for library IL initiatives                                            | .514    | .148       | 1.000    | .288       |
| 30  | Collaboration between the library and the university administration, emphasizing a strategic approach in achieving SDG goals through IL | .512    | .159       | 1.000    | .311       |
| 31  | The university library IL programs work to reduce poverty by helping to get jobs SDG-1: No poverty                                      | .944    | .700       | 1.000    | .741       |
| 32  | IL programs work to end hunger by offering information ensuring SDG-2: Zero hunger                                                      | .779    | .474       | 1.000    | .609       |
| 33  | IL programs contribute to improving the quality of education (SDG-4)                                                                    | .553    | .187       | 1.000    | .338       |
| 34  | IL programs empower women and provide equal access to all to ensure SDG 5: Gender equality                                              | .445    | .124       | 1.000    | .279       |
| 35  | IL skills help to achieve career development or job-seeking activities ensuring SDG-8: Decent work and economic growth                  | .533    | .174       | 1.000    | .327       |
| 36  | IL programs address the social and digital inequality-related issues to ensure SDG 10: Reduced inequality                               | .607    | .284       | 1.000    | .468       |
| 37  | IL programs collaborate with departments and other offices of the university to ensure SDG 17: Partnerships for the Goals               | .499    | .171       | 1.000    | .342       |
| 38  | IL programs promote sustainable practices among students, supporting SDG 12: Responsible Consumption and Production                     | .595    | .128       | 1.000    | .215       |
| 39  | IL programs support health and well-being by providing resources on health literacy, supporting SDG 3: Good Health and Well-being       | .502    | .186       | 1.000    | .370       |
| 40  | IL programs raise awareness on climate-related information to encourage action, supporting SDG 13: Climate Action                       | .760    | .427       | 1.000    | .562       |

*Extraction Method: Principal Component Analysis*

The total variance explained (Table 4.20) provides insights into how much of the total variance is captured by the extracted components. Key observations include:

- i. *Four Key Components Identified:* The first four components have eigenvalues greater than 1, explaining a total of 60.64% of the variance in the dataset.
- ii. *Dominant Component:* The first component alone explains 32.53% of the variance, indicating a strong underlying factor influencing responses.
- iii. *Second and Third Components:* These contribute 16.95% and 7.34%, respectively, bringing the cumulative variance explained to 56.82%.
- iv. *Fourth Component:* Adds another 3.83%, pushing the total explained variance to 60.64%.

After rotation, the variance is more consistently distributed among the four components, which helps in a better explanation. This suggests that multiple dimensions influence IL initiatives and their impact on achieving the SDGs.

**Table 4.20: Total variance explained**

| Component |    | Initial Eigenvalues <sup>a</sup> |               |              | Extraction Sums of Squared Loadings |               |              | Rotation Sums of Squared Loadings |               |              |
|-----------|----|----------------------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|---------------|--------------|
|           |    | Total                            | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % | Total                             | % of Variance | Cumulative % |
| Raw       | 1  | 10.223                           | 32.528        | 32.528       | 10.223                              | 32.528        | 32.528       | 3.116                             | 9.913         | 9.913        |
|           | 2  | 5.328                            | 16.953        | 49.482       | 5.328                               | 16.953        | 49.482       | 2.618                             | 8.329         | 18.242       |
|           | 3  | 2.305                            | 7.335         | 56.817       | 2.305                               | 7.335         | 56.817       | 3.107                             | 9.887         | 28.129       |
|           | 4  | 1.202                            | 3.825         | 60.642       | 1.202                               | 3.825         | 60.642       | 10.218                            | 32.513        | 60.642       |
|           | 5  | .970                             | 3.085         | 63.727       |                                     |               |              |                                   |               |              |
|           | 6  | .892                             | 2.837         | 66.564       |                                     |               |              |                                   |               |              |
|           | 7  | .834                             | 2.654         | 69.219       |                                     |               |              |                                   |               |              |
|           | 8  | .768                             | 2.445         | 71.664       |                                     |               |              |                                   |               |              |
|           | 9  | .689                             | 2.193         | 73.857       |                                     |               |              |                                   |               |              |
|           | 10 | .626                             | 1.992         | 75.849       |                                     |               |              |                                   |               |              |
|           | 11 | .582                             | 1.851         | 77.700       |                                     |               |              |                                   |               |              |
|           | 12 | .527                             | 1.676         | 79.376       |                                     |               |              |                                   |               |              |
|           | 13 | .500                             | 1.592         | 80.968       |                                     |               |              |                                   |               |              |
|           | 14 | .471                             | 1.500         | 82.468       |                                     |               |              |                                   |               |              |
|           | 15 | .440                             | 1.401         | 83.869       |                                     |               |              |                                   |               |              |
|           | 16 | .405                             | 1.288         | 85.157       |                                     |               |              |                                   |               |              |
|           | 17 | .394                             | 1.253         | 86.411       |                                     |               |              |                                   |               |              |
|           | 18 | .371                             | 1.181         | 87.592       |                                     |               |              |                                   |               |              |
|           | 19 | .341                             | 1.084         | 88.676       |                                     |               |              |                                   |               |              |
|           | 20 | .328                             | 1.043         | 89.719       |                                     |               |              |                                   |               |              |
|           | 21 | .283                             | .899          | 90.619       |                                     |               |              |                                   |               |              |
|           | 22 | .270                             | .858          | 91.477       |                                     |               |              |                                   |               |              |
|           | 23 | .248                             | .789          | 92.266       |                                     |               |              |                                   |               |              |
|           | 24 | .239                             | .761          | 93.027       |                                     |               |              |                                   |               |              |
|           | 25 | .226                             | .720          | 93.748       |                                     |               |              |                                   |               |              |
|           | 26 | .223                             | .708          | 94.456       |                                     |               |              |                                   |               |              |
|           | 27 | .200                             | .635          | 95.091       |                                     |               |              |                                   |               |              |
|           | 28 | .187                             | .595          | 95.686       |                                     |               |              |                                   |               |              |
|           | 29 | .175                             | .556          | 96.242       |                                     |               |              |                                   |               |              |
|           | 30 | .155                             | .494          | 96.736       |                                     |               |              |                                   |               |              |
|           | 31 | .152                             | .484          | 97.220       |                                     |               |              |                                   |               |              |
|           | 32 | .143                             | .455          | 97.674       |                                     |               |              |                                   |               |              |
|           | 33 | .132                             | .420          | 98.094       |                                     |               |              |                                   |               |              |
|           | 34 | .116                             | .371          | 98.465       |                                     |               |              |                                   |               |              |
|           | 35 | .107                             | .339          | 98.804       |                                     |               |              |                                   |               |              |
|           | 36 | .098                             | .311          | 99.115       |                                     |               |              |                                   |               |              |
|           | 37 | .087                             | .277          | 99.392       |                                     |               |              |                                   |               |              |
|           | 38 | .071                             | .225          | 99.617       |                                     |               |              |                                   |               |              |
|           | 39 | .067                             | .212          | 99.829       |                                     |               |              |                                   |               |              |
|           | 40 | .054                             | .171          | 100.000      |                                     |               |              |                                   |               |              |

Extraction Method: *Principal Component Analysis*. <sup>a</sup>When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

#### 4.2.6.4 Factor analysis: Rotated component matrix of IL programs

The Rotated component matrix categorizes the variables related to IL programs into four distinct factors using Principal Component Analysis (PCA) with Variminrotation. Each factor groups related items based on their strongest loadings, highlighting different dimensions of IL programs in the university library (Table 4.21).

#### 4.2.6.5 Key factor groupings and interpretation

##### ***Factor 1: User engagement and skill development (% of variance 32.528: strongest component)***

This factor emphasizes the role of the library in enhancing user skills and engagement in IL activities. The highest-loading variables include:

- a) “Taking initiatives to promote user skills and higher study” (.739)
- b) “University library policies influence IL effectiveness” (.695)
- c) “Motivation to use the library’s IL resources” (.656)
- d) “Participation in IL workshops or training” (.655)
- e) “Taking user feedback to improve IL programs” (.611)

These indicate that institutional strategies and user participation significantly influence IL program success.

##### ***Factor 2: Digital literacy training and resource accessibility (% of variance 16.953)***

This factor highlights the availability and accessibility of IL resources in both digital and physical formats. Key contributing variables include:

- a) “The library can offer personalized research assistance” (.723)
- b) “Encouraging users to use online reference services” (.693)
- c) “Having physical and digital resources, databases, and learning materials” (.689)
- d) “Offering training on Internet and digital tools” (.682)
- e) “Providing online tutorials for IL skills” (.626)

These indicate that library resources and digital literacy training are crucial for effective IL implementation.

##### ***Factor 3: Economic, social and environmental well-being (% of variance 7.335)***

This factor connects IL programs with broader global development goals, highlighting their societal impact. Major loadings include:

- a) “IL programs help in job-seeking and career development (SDG-8)” (.828)
- b) “IL programs work to end hunger by offering information (SDG-2)” (.768)
- c) “IL programs raise awareness of climate change (SDG-13)” (.743)
- d) “IL programs address digital inequality (SDG-10)” (.612)

This suggests that IL initiatives extend beyond academic settings to contribute to economic, social, and environmental well-being.

**Factor 4: Institutional and financial support (% of variance 3.825)**

This factor focuses on the role of financial and administrative support in IL programs.

Key variables include:

- a) “Institutional support affects staff motivation and program outcomes” (-.087)
- b) “The university should have a well-funded policy for library resources” (-.090)
- c) “Financial constraints impact IL program reach” (-.075)

It underscores that adequate funding and institutional commitment are essential for sustaining and expanding IL programs.

*Summary*

- i. Factor 1 (User Engagement and Skill Development) is the strongest, explaining the most variance in IL program effectiveness.
- ii. Factor 2 emphasizes the importance of library resources and training opportunities.
- iii. Factor 3 emphasizes on economic, social, and environmental well-being
- iv. Factor 4 highlights financial and institutional challenges affecting IL implementation.

This factor analysis assists in recognizing key areas for enlightening IL programs, confirming better resource allocation, user engagement, and alignment with global educational goals.

**Table 4.21: Rotated component matrix<sup>a</sup>**

| Factor                                                                      | Raw Component |       |      |      | Rescaled Component |       |      |      |
|-----------------------------------------------------------------------------|---------------|-------|------|------|--------------------|-------|------|------|
|                                                                             | 1             | 2     | 3    | 4    | 1                  | 2     | 3    | 4    |
| Taking initiatives to promote user skills and higher study                  | <b>.586</b>   | .085  | .130 | .066 | .739               | .108  | .164 | .084 |
| The university library policies influence the effectiveness of IL programs. | <b>.585</b>   | -.032 | .162 | .031 | .695               | -.038 | .193 | .036 |
| Motivation to use the library’s IL resources                                | <b>.496</b>   | .168  | .120 | .025 | .656               | .223  | .158 | .033 |
| Participation in IL workshops or training sessions offered by the library   | <b>.426</b>   | .177  | .076 | .016 | .655               | .272  | .117 | .025 |
| Taking user feedback to improve the effectiveness of IL programs            | <b>.404</b>   | .122  | .143 | .011 | .611               | .184  | .216 | .017 |
| Tracking user engagement through different activities                       | <b>.434</b>   | .184  | .282 | .054 | .544               | .231  | .353 | .068 |

| Factor                                                                                                                                   | Raw Component |             |       |       | Rescaled Component |      |       |       |
|------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|-------|-------|--------------------|------|-------|-------|
|                                                                                                                                          | 1             | 2           | 3     | 4     | 1                  | 2    | 3     | 4     |
| Sharing the IL skills with colleagues in everyday services                                                                               | <b>.377</b>   | .281        | .045  | .043  | .526               | .391 | .062  | .060  |
| IL programs contribute to improving the quality of education (SDG-4)                                                                     | <b>.371</b>   | .221        | .027  | .022  | .498               | .297 | .037  | .029  |
| The university library should have well funding policy to improve the quality of library resources.                                      | <b>.363</b>   | .223        | .028  | -.067 | .487               | .299 | .037  | -.090 |
| Institutional support affects library staff motivation and program outcomes.                                                             | <b>.331</b>   | .044        | -.012 | -.061 | .474               | .063 | -.017 | -.087 |
| The library should identify cultural and social barriers in adopting the IL activities.                                                  | <b>.328</b>   | .096        | .238  | .040  | .452               | .132 | .328  | .055  |
| Collaboration between the library and the university administration, emphasizing a strategic approach in achieving SDG goals through IL. | <b>.296</b>   | .225        | .143  | .014  | .414               | .315 | .199  | .020  |
| Provision of IL programs that meet learning needs                                                                                        | <b>.256</b>   | .236        | .174  | .038  | .389               | .358 | .264  | .058  |
| The financial constraints of the library impact the delivery and reach of IL initiatives.                                                | <b>.268</b>   | .100        | .025  | -.059 | .343               | .128 | .033  | -.075 |
| The library can offer personalized research assistance to help users find information.                                                   | -.071         | <b>.562</b> | -.009 | -.082 | -.092              | .723 | -.011 | -.105 |
| The library can encourage users to use online reference services                                                                         | .134          | <b>.469</b> | .071  | .015  | .198               | .693 | .105  | .022  |
| The library should have physical and digital resources, databases, and learning materials                                                | .039          | <b>.446</b> | -.062 | .061  | .060               | .689 | -.096 | .094  |
| The library can offer training to help users to use the Internet and other digital tools effectively                                     | .356          | <b>.518</b> | .016  | .016  | .469               | .682 | .021  | .021  |
| The library can organize workshops and webinars on IL topics e.g. search techniques, use online sources                                  | .111          | <b>.441</b> | .114  | -.002 | .163               | .646 | .167  | -.004 |
| The library can offer online tutorials to teach information literacy skills                                                              | .134          | <b>.421</b> | -.043 | -.057 | .200               | .626 | -.064 | -.085 |
| Library can offer services about plagiarism and how to avoid it                                                                          | .124          | <b>.412</b> | .241  | -.013 | .179               | .595 | .348  | -.019 |
| The library can offer user orientation training programs                                                                                 | .156          | <b>.351</b> | .052  | -.015 | .232               | .521 | .077  | -.023 |
| The library colleagues can be enthusiastic about offering IL-related activities.                                                         | .309          | <b>.371</b> | -.039 | .039  | .429               | .515 | -.054 | .055  |
| The library can collaborate with faculty members to promote IL in academic activities                                                    | .148          | <b>.304</b> | .053  | -.004 | .231               | .475 | .083  | -.007 |
| Application of IL skills from the library to routine operations                                                                          | .192          | <b>.308</b> | .217  | .049  | .275               | .441 | .311  | .071  |
| Taking strategies to increase user participation in the IL initiatives                                                                   | .224          | <b>.243</b> | .209  | -.049 | .324               | .351 | .302  | -.07  |

| Factor                                                                                                                            | Raw Component |       |             |             | Rescaled Component |       |       |      |
|-----------------------------------------------------------------------------------------------------------------------------------|---------------|-------|-------------|-------------|--------------------|-------|-------|------|
|                                                                                                                                   | 1             | 2     | 3           | 4           | 1                  | 2     | 3     | 4    |
| The university library IL programs work to reduce poverty by helping to get jobs SDG-1: No poverty                                | -.204         | .095  | <b>.804</b> | .046        | -.210              | .098  | .828  | .047 |
| IL programs work to end hunger by offering information ensuring SDG-2: Zero hunger                                                | -.089         | -.050 | <b>.678</b> | .062        | -.101              | -.056 | .768  | .070 |
| IL programs raise awareness on climate-related information to encourage action, supporting SDG 13: Climate Action                 | .053          | -.070 | <b>.648</b> | .014        | .061               | -.080 | .743  | .017 |
| IL programs address the social and digital inequality-related issues to ensure SDG 10: Reduced inequality                         | .219          | .089  | <b>.477</b> | -.034       | .281               | .114  | .612  | -.04 |
| IL programs support health and well-being by providing resources on health literacy, supporting SDG 3: Good Health and Well-being | .115          | -.048 | <b>.410</b> | .043        | .162               | -.067 | .579  | .061 |
| IL programs collaborate with departments and other offices of the university to ensure SDG 17: Partnerships for the Goals         | .053          | .174  | <b>.360</b> | -.090       | .076               | .246  | .509  | -.12 |
| The library's limited online resources influence the effectiveness of online IL resources                                         | .194          | .043  | <b>.394</b> | -.062       | .246               | .055  | .498  | -.07 |
| IL programs promote sustainable practices among students, supporting SDG 12: Responsible Consumption and Production               | .064          | .028  | <b>.348</b> | .047        | .083               | .037  | .451  | .061 |
| IL programs empower women and provide equal access to all to ensure SDG 5: Gender equality                                        | .195          | .052  | <b>.288</b> | .022        | .292               | .078  | .432  | .034 |
| IL skills help to achieve career development or job-seeking activities ensuring SDG-8: Decent work and economic growth            | .262          | .068  | <b>.304</b> | -.093       | .359               | .093  | .416  | -.12 |
| The library can minimize the impact of the digital divide through IL skill development.                                           | .151          | .158  | <b>.249</b> | -.056       | .207               | .217  | .341  | -.07 |
| The university's adequate support such as funding and budget need for library IL initiatives.                                     | .210          | .221  | <b>.222</b> | -.075       | .293               | .309  | .309  | -.10 |
| The library adapts IL programs to address the diverse student needs.                                                              | .195          | .068  | <b>.200</b> | -.046       | .261               | .091  | .268  | -.06 |
| Assistance in community involvement and initiatives                                                                               | .045          | -.017 | -.002       | <b>3.18</b> | .014               | -.005 | -.001 | 1.00 |

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization. <sup>a</sup>Rotation converged in 6 iterations.

#### 4.2.6.6 Individual factor analysis: promoting IL programs

The study scrutinizes individual factors such as “Promoting Information Literacy Programs” as a factor, which plays a crucial role to promote information literacy

activities within the university library. The factor loadings indicate the strength of each variable's contribution to this factor (Table 4.22).

**Table 4.22: Communalities and component matrix: Promoting IL programs**

| No. | Factors                                                                                              | Communalities |            | Component matrix |
|-----|------------------------------------------------------------------------------------------------------|---------------|------------|------------------|
|     |                                                                                                      | Initial       | Extraction |                  |
| 1   | The library can offer user orientation training programs                                             | 1.000         | .343       | .585             |
| 2   | The library can organize workshops and webinars on IL topics                                         | 1.000         | .505       | .711             |
| 3   | The library can offer training to help users to use the Internet and other digital tools effectively | 1.000         | .635       | .797             |
| 4   | Library can offer services about plagiarism and how to avoid it                                      | 1.000         | .418       | .646             |
| 5   | The library should have physical and digital resources, databases, and learning materials            | 1.000         | .445       | .667             |
| 6   | The library can offer online tutorials to teach information literacy skills                          | 1.000         | .454       | .673             |
| 7   | The library can offer personalized research assistance to help users find information.               | 1.000         | .351       | .592             |
| 8   | The library can collaborate with faculty members to promote IL in academic activities                | 1.000         | .357       | .597             |
| 9   | The library can encourage users to use online reference services                                     | 1.000         | .582       | .763             |
| 10  | The library colleagues can be enthusiastic about offering IL-related activities.                     | 1.000         | .419       | .647             |

*Extraction method: Principal component analysis.*

#### *Key findings and ranking*

- i. The highest contributing variable based on the component matrix is “*The library can offer training to help users to use the Internet and other digital tools effectively*” (.797), highlighting the importance of digital literacy support.
- ii. “*The library can encourage users to use online reference services*” (.763) and “*The library can organize workshops and webinars on IL topics*” (.711) also show strong associations with this factor.
- iii. Other notable contributions include “*The library can offer online tutorials to teach information literacy skills*” (.673) and “*The library should have physical and digital resources, databases, and learning materials*” (.667).
- iv. The lowest loading variable is “*The library can offer user orientation training programs*” (.585), though it still contributes significantly.

This underscores the university library's essential role in fostering IL, digital skills, and research support to enhance user engagement and academic success.

#### 4.2.6.7 Individual factor analysis: user engagement and knowledge-sharing

Table 4.23 presents the Communalities and component matrix derived from Principal Component Analysis (PCA), identifying key factors that influence user engagement and knowledge sharing in IL programs.

##### *Key findings*

##### 1. High Factor Loadings Indicate Strong Influence

- a) “Taking initiatives to promote user skills and higher study” (.758)
- b) “Taking user feedback to improve IL programs” (.733)
- c) “Motivation to use the library’s IL resources” (.729)
- d) “Sharing IL skills with colleagues” (.726)

These variables indicate that user motivation, active participation, and peer knowledge-sharing significantly enhance IL engagement.

##### 2. Library Programs Foster Learning and Engagement

- a) “Participation in IL workshops or training sessions” (.702)
- b) “Tracking user engagement through different activities” (.684)
- c) “Application of IL skills in routine operations” (.668)

These factors show that active involvement in IL workshops and practical application of IL skills drive knowledge-sharing behaviors.

##### 3. User Feedback and Strategic Participation Enhance Effectiveness

- a) “Taking strategies to increase user participation” (.595)
- b) “Provision of IL programs that meet learning needs” (.630)

This suggests that user-centric IL programs and strategic participation initiatives strengthen engagement and improve learning outcomes.

##### 4. Community Engagement Shows Lower Factor Loading

- a) “Assistance in community involvement and initiatives” (.082)

This factor has the lowest loading, indicating that community involvement in IL programs may be underdeveloped or have less direct influence on user engagement.

The analysis highlights that user motivation, participation in IL activities, and peer knowledge-sharing are the strongest contributors to engagement. Effective strategies to increase participation, apply IL skills, and track user involvement can further enhance knowledge-sharing. However, community involvement needs further attention to expand the impact of IL programs beyond the university setting.

**Table 4.23: Communalities and component matrix**

| No. | Factor                                                                    | Communalities |            | Component matrix |
|-----|---------------------------------------------------------------------------|---------------|------------|------------------|
|     |                                                                           | Initial       | Extraction |                  |
| 1   | Participation in IL workshops or training sessions offered by the library | 1.000         | .502       | .702             |
| 2   | Motivation to use the library's IL resources                              | 1.000         | .618       | .729             |
| 3   | Provision of IL programs that meet learning needs                         | 1.000         | .414       | .630             |
| 4   | Application of IL skills from the library to routine operations           | 1.000         | .469       | .668             |
| 5   | Assistance in community involvement and initiatives                       | 1.000         | .565       | .082             |
| 6   | Sharing the IL skills with colleagues in everyday services                | 1.000         | .548       | .726             |
| 7   | Taking strategies to increase user participation in the IL initiatives    | 1.000         | .626       | .595             |
| 8   | Taking user feedback to improve the effectiveness of IL programs          | 1.000         | .539       | .733             |
| 9   | Tracking user engagement through different activities                     | 1.000         | .504       | .684             |
| 10  | Taking initiatives to promote user skills and higher study                | 1.000         | .618       | .758             |

*Extraction method: Principal component analysis.*

#### 4.2.6.8 Individual factor analysis: institutional policy and support

The factor analysis of institutional policy and support discloses the critical role of university policies, funding, and institutional backing in the effectiveness of IL programs.

Table 4.24 shows the highest-ranking factor is “*collaboration between the library and the university administration, emphasizing a strategic approach in achieving SDG goals through IL*” (.664). This underscores the importance of integrating IL initiatives within broader institutional strategies. Following closely, “*the university's adequate support, such as funding and budget for IL initiatives*” (.640), highlights the necessity of financial backing to sustain and expand IL programs. “*The university library policies influencing IL program effectiveness*” (.608) and “*identifying cultural and social barriers to IL adoption*” (.604) also play a significant role, emphasizing the need for policy-driven and socially inclusive strategies.

Other notable factors include “*the library’s limited online resources impacting the effectiveness of IL programs*” (.556) and “*minimizing the digital divide through IL skill development*” (.501), which stress the role of technology and accessibility in institutional support. “*Institutional support affecting library staff motivation and program outcomes*” (.461) indicates that administrative encouragement is crucial for the success of IL initiatives.

On the lower end, “*financial constraints impacting the delivery and reach of IL initiatives*” (.418) and “*the library adapting IL programs to address diverse student needs*” (.335) rank lower, suggesting that while funding limitations are recognized, their impact is less pronounced compared to administrative collaboration and structured financial policies. Finally, the findings emphasize that strategic collaboration, adequate funding, and inclusive policies are the most influential factors in strengthening IL programs, while addressing financial limitations and student diversity requires further attention.

**Table 4.24: Factor analysis of institutional policy and support**

| No. | Communalities<br>Factors                                                                                                                 | Initial |            | Component<br>matrix |
|-----|------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|---------------------|
|     |                                                                                                                                          | Initial | Extraction |                     |
| 1   | The university library policies influence the effectiveness of IL programs.                                                              | 1.000   | .385       | .608                |
| 2   | The university library should have well funding policy to improve the quality of library resources.                                      | 1.000   | .390       | .591                |
| 3   | Institutional support affects library staff motivation and program outcomes.                                                             | 1.000   | .577       | .461                |
| 4   | The financial constraints of the library impact the delivery and reach of IL initiatives.                                                | 1.000   | .377       | .418                |
| 5   | The library adapts IL programs to address the diverse student needs.                                                                     | 1.000   | .265       | .335                |
| 6   | The library should identify cultural and social barriers in adopting the IL activities.                                                  | 1.000   | .501       | .604                |
| 7   | The library can minimize the impact of the digital divide through IL skill development.                                                  | 1.000   | .487       | .501                |
| 8   | The library’s limited online resources influence the effectiveness of online IL resources.                                               | 1.000   | .380       | .556                |
| 9   | The university’s adequate support such as funding and budget need for library IL initiatives.                                            | 1.000   | .412       | .640                |
| 10  | Collaboration between the library and the university administration, emphasizing a strategic approach in achieving SDG goals through IL. | 1.000   | .487       | .664                |

*Extraction method: Principal component analysis.*

#### 4.2.6.9 Factor analysis: contribution of IL programs to SDGs

The fourth individual factor analysis exposes the significant contributions of IL programs to various SDGs, highlighting their role in economic, social, and environmental development (Table 4.25).

##### *Key findings*

1. Strongest impact areas:
  - a) “*Reducing poverty (SDG-1: No Poverty)*” (.712) emerges as the most impactful factor, demonstrating the role of IL programs in enhancing job opportunities.
  - b) “*Climate action (SDG-13)*” (.730) and “*ending hunger (SDG-2)*” (.695) also rank highly, indicating that IL programs help raise awareness and provide essential information for sustainability.
2. Social equity and well-being:
  - a) Addressing social and digital inequality (SDG-10) (.679) and supporting health literacy (SDG-3) (.658) show that IL contributes significantly to reducing disparities and improving public well-being.
  - b) Empowering women and promoting gender equality (SDG-5) (.597) further highlight IL’s role in fostering inclusivity.
3. Institutional and educational contributions:
  - a) “*Collaboration for SDG-17 (Partnerships for the Goals)*” (.562) emphasizes the necessity of institutional cooperation to maximize IL’s effectiveness.
  - b) “*Promoting sustainable practices (SDG-12)*” (.523) and “*career development (SDG-8)*” (.531) showcase IL’s role in professional growth and environmental consciousness.
4. Education-related impact:
  - a) “*IL programs contributing to quality education (SDG-4)*” (.256) rank relatively lower, suggesting that while IL enhances learning, its direct contribution to education quality might be secondary to other areas.

The findings specify that IL programs significantly support financial empowerment, social equity, sustainability, and institutional collaboration, with particularly strong contributions to poverty reduction, climate action, and digital inclusion. These

insights strengthen the need for continual speculation in IL initiatives to maximize their growing influence.

**Table 4.25: Factor analysis: Contribution of SDG through IL programs**

| No. | Communalities                                                                                                                     | Component |            |      |
|-----|-----------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------|
|     |                                                                                                                                   | Initial   | Extraction |      |
| 1   | The university library IL programs work to reduce poverty by helping to get jobs SDG-1: No poverty                                | 1.000     | .728       | .712 |
| 2   | IL programs work to end hunger by offering information ensuring SDG-2: Zero hunger                                                | 1.000     | .706       | .695 |
| 3   | IL programs contribute to improving the quality of education (SDG-4)                                                              | 1.000     | .666       | .256 |
| 4   | IL programs empower women and provide equal access to all to ensure SDG 5: Gender equality                                        | 1.000     | .433       | .597 |
| 5   | IL skills help to achieve career development or job-seeking activities ensuring SDG-8: Decent work and economic growth            | 1.000     | .487       | .531 |
| 6   | IL programs address the social and digital inequality-related issues to ensure SDG 10: Reduced inequality                         | 1.000     | .531       | .679 |
| 7   | IL programs collaborate with departments and other offices of the university to ensure SDG 17: Partnerships for the Goals         | 1.000     | .744       | .562 |
| 8   | IL programs promote sustainable practices among students, supporting SDG 12: Responsible Consumption and Production               | 1.000     | .709       | .523 |
| 9   | IL programs support health and well-being by providing resources on health literacy, supporting SDG 3: Good Health and Well-being | 1.000     | .568       | .658 |
| 10  | IL programs raise awareness on climate-related information to encourage action, supporting SDG 13: Climate Action                 | 1.000     | .562       | .730 |

*Extraction method: Principal component analysis.*

The factor analysis of library professionals' perspectives on IL programs measures their critical role in user engagement, institutional support, and sustainable development. The findings expose that IL programs enhance user skills, foster knowledge-sharing, and support academic and professional growth. Participation in IL workshops and motivation to use IL resources and initiatives to improve user engagement rank are key contributors to knowledge dissemination and skill development.

Institutional policies and support mechanisms meaningfully influence the effectiveness of IL programs. Sufficient funding, strategic collaboration, and overcoming digital and cultural obstacles are essential to improving IL initiatives. The findings suggest that strong institutional backing, including financial resources and policy frameworks, are crucial for sustaining effective IL programs.

Moreover, the study underlines the significant contribution of IL programs to the SDGs. IL initiatives play a crucial role in reducing poverty, addressing digital and social inequalities, promoting health literacy, and ensuring environmental sustainability. The analysis indicates that IL programs not only support academic and research activities but also contributes to broader economic, social, and environmental advancements.

In conclusion, library professionals must continue to refine IL strategies, ensure institutional support and foster collaborations to maximize IL's impact. By addressing challenges such as funding limitations, digital resource accessibility, and user engagement, IL programs can further empower students, researchers, and the community, making a lasting contribution to education, professional development, and sustainable growth.

## 4.2.7 Data analysis (Library users)

### 4.2.7.1 Demographic profile of the user respondents

The demographic profile of user respondents provides insights into their user type, university category, gender distribution, and age group. In terms of user type, the majority of respondents were Honors students (72.4%), followed by Master's students (12.5%), faculty members (10.9%), and researchers pursuing MPhil (2.3%) and PhD (1.9%). This indicates that the study predominantly reflects the perspectives of undergraduate and postgraduate students (Table 4.26).

**Table 4.26: Demographic information of the user respondents** ( $n=439$ )

| User Type                  | Frequency | Percent | Cumulative % |
|----------------------------|-----------|---------|--------------|
| Faculty                    | 48        | 10.9    | 10.9         |
| PhD Researcher             | 8         | 1.9     | 12.8         |
| MPhil Researcher           | 10        | 2.3     | 15.0         |
| Master's Student           | 55        | 12.5    | 27.6         |
| Honor's Student            | 318       | 72.4    | 100.0        |
| <b>University category</b> |           |         |              |
| Public                     | 214       | 48.8    | 48.8         |
| Private                    | 206       | 46.9    | 95.7         |
| International              | 19        | 4.3     | 100.0        |
| <b>Gender</b>              |           |         |              |
| Female                     | 196       | 44.6    | 44.6         |
| Male                       | 243       | 55.4    | 100.0        |
| <b>Age group</b>           |           |         |              |
| Under 21 years             | 39        | 8.9     | 8.9          |
| 21-25 years                | 323       | 73.6    | 82.5         |
| 26-30 years                | 34        | 7.7     | 90.2         |
| 31-35 years                | 12        | 2.7     | 92.9         |
| 36-40 years                | 7         | 1.6     | 94.5         |
| 41-45 years                | 12        | 2.7     | 97.3         |
| 46-50 years                | 9         | 2.1     | 99.3         |
| 51-55 years                | 2         | .5      | 99.8         |
| 56 and above years         | 1         | .2      | 100.0        |

Regarding the university category, public university users 48.8% slightly outnumbered private university users 46.9%, while a small proportion 4.3% represented international universities. The gender distribution shows a higher participation of male respondents 55.4% compared to female respondents 44.6%. Regarding age distribution, the majority of respondents 73.6% were in the 21-25 age group, which aligns with the dominance of undergraduate and Master's students. The second-largest group was those under 21 years 8.9%, followed by smaller proportions in 26-30 years 7.7%, 31-35 years 2.7%, and other older age groups. A minimal number of respondents 0.2% were 56 years and above. Overall, the demographic data indicate that the study primarily represents young university students, with a balanced mix of public and private university users and a slightly higher proportion of male respondents.

#### 4.2.7.2 Library visit

The data from Table 4.27 shows that library visit frequency varies among users. A significant proportion of respondents, 31.7% visit the library occasionally, indicating a flexible or need-based approach. However, a substantial 27.1% of users visit the library daily, demonstrating a strong reliance on library resources. Additionally, 22.1% visit the library weekly, while 16.6% visit twice a week, suggesting that nearly two-thirds of users have regular library interactions. In contrast, infrequent visits are recorded among fortnightly 0.9% and monthly users 1.6%, showing that only a small segment of users access the library on a rare basis. Overall, the data indicate a balanced mix of regular and occasional users, with more than half 65.8% visiting at least once a week, highlighting the library's relevance in academic life.

**Table 4.27: Library visit frequency**

|              | Frequency | Percent | Cumulative % |
|--------------|-----------|---------|--------------|
| Daily        | 119       | 27.1    | 27.1         |
| Twice a week | 73        | 16.6    | 43.7         |
| Weekly       | 97        | 22.1    | 65.8         |
| Fortnightly  | 4         | .9      | 66.7         |
| Monthly      | 7         | 1.6     | 68.3         |
| Occasionally | 139       | 31.7    | 100.0        |
| Total        | 439       | 100.0   |              |

The Mann–Whitney U test (Table 4.28) was conducted to examine whether significant gender-based differences exist in the frequency of library visits. The results show a statistically significant difference between female and male respondents ( $U = 17024.000$ ,  $Z = -5.320$ ,  $p < .001$ ). The mean rank for females (254.64) was higher than for males (192.06), indicating that female respondents visit the library more frequently than their male counterparts. This suggests a gender disparity in library usage patterns, with females demonstrating higher engagement in library visits.

**Table 4.28: Mann-Whitney test ranks<sup>a</sup>**

|                        | Gender | N   | Mean Rank | Sum of Ranks                |
|------------------------|--------|-----|-----------|-----------------------------|
| Library visit          | Female | 196 | 254.64    | 49910.00                    |
|                        | Male   | 243 | 192.06    | 46670.00                    |
|                        | Total  | 439 |           |                             |
|                        |        |     |           | Library visits by the users |
| Mann-Whitney U         |        |     |           | 17024.000                   |
| Wilcoxon W             |        |     |           | 46670.000                   |
| Z                      |        |     |           | -5.320                      |
| Asymp. Sig. (2-tailed) |        |     |           | .000                        |

<sup>a</sup>Grouping Variable: Gender

#### 4.2.7.3 Awareness, use and level of satisfaction on IL services

##### 4.2.7.3.1 Awareness of IL programs

Table 4.29 reveals the awareness IL programs among university library users shows a lack of widespread knowledge. Only 41.9% of respondents are aware of the IL programs offered by their university libraries, while a larger proportion 45.1% are unaware of such initiatives. Additionally, 13.0% are not sure, indicating uncertainty about the existence or purpose of these programs. This data suggest a need for better promotion and communication of IL programs to enhance user engagement and maximize their benefits. Libraries may need to implement targeted awareness campaigns to ensure more users recognize and utilize these programs effectively.

**Table 4.29: Awareness of the IL programs offered by the university library**

|          | Frequency | Percent | Cumulative % |
|----------|-----------|---------|--------------|
| Yes      | 184       | 41.9    | 41.9         |
| No       | 198       | 45.1    | 87.0         |
| Not sure | 57        | 13.0    | 100.0        |
| Total    | 439       | 100.0   |              |

#### 4.2.7.3.2 Participation in the IL programs

Table 4.30 reveals that only 28.7% of respondents have participated in IL programs or workshops offered by their university libraries, while a significant majority, 71.3%, have never engaged in such initiatives. This low participation rate suggests that either awareness is insufficient or the programs are not effectively attracting users. To improve engagement, libraries may need to enhance promotion, tailor content to user needs, and introduce incentives for participation. Strengthening outreach efforts and integrating IL training into academic curricula could also encourage greater involvement.

**Table 4.30: Participation in IL programs or workshops offered by the library**

|       | Frequency | Percent | Cumulative % |
|-------|-----------|---------|--------------|
| Yes   | 126       | 28.7    | 28.7         |
| No    | 313       | 71.3    | 100.0        |
| Total | 439       | 100.0   |              |

#### 4.2.7.3.3 Importance of IL in academic activities

The data indicate that a majority of respondents recognize the importance of IL for academic success. 44.9% consider IL important, and 24.8% view it as very important, collectively making up 69.7% of the responses. However, 29.2% remain neutral, suggesting a gap in understanding its relevance. Only a negligible 1.1% believes IL is unimportant. This highlights the need for greater awareness and integration of IL into academic activities to emphasize its role in research, critical thinking, and effective information use. Targeted outreach and curriculum-based IL training could help shift neutral perceptions toward a more positive stance (Table 4.31).

**Table 4.31: Importance of IL for academic success**

|                      | Frequency | Percent | Cumulative % |
|----------------------|-----------|---------|--------------|
| Not important at all | 3         | .6      | .6           |
| Not important        | 2         | .5      | 1.1          |
| Neutral              | 128       | 29.2    | 30.3         |
| Important            | 197       | 44.9    | 75.2         |
| Very important       | 109       | 24.8    | 100.0        |
| Total                | 439       | 100.0   |              |

#### 4.2.7.3.4 Rating the IL skill

Table 4.32 exposes that a majority of respondents 44.0% rate their IL skills as adequate. In comparison, 24.4% consider them strong and 11.8% very strong, indicating that over 80% of users have at least a moderate level of IL proficiency. However, 15.9% perceive their skills as weak, and 3.9% as very weak, highlighting a segment that may struggle with effective information use. These findings suggest that while many users feel confident in their IL abilities, a significant portion requires further support and training. Strengthening IL programs and providing targeted skill-building workshops could help bridge this gap and improve overall competency levels.

**Table 4.32: Rating of IL skills**

|             | Frequency | Percent | Cumulative % |
|-------------|-----------|---------|--------------|
| Very weak   | 17        | 3.9     | 3.9          |
| Weak        | 70        | 15.9    | 19.8         |
| Adequate    | 193       | 44.0    | 63.8         |
| Strong      | 107       | 24.4    | 88.2         |
| Very strong | 52        | 11.8    | 100.0        |
| Total       | 439       | 100.0   |              |

#### 4.2.7.3.5 Variance in awareness towards IL activities (University category)

The variance analysis on awareness of IL activities across university categories reveals notable insights. Awareness levels are similar among the public (Mean = 1.70, SD = 0.689), private (Mean = 1.71, SD = 0.672), and international universities

(Mean= 1.89, SD = 0.737), indicating slightly higher awareness in international institutions. Participation in IL programs follows a similar pattern, with public (Mean = 1.73, SD = 0.446) and private (Mean = 1.69, SD = 0.462) universities showing close engagement levels, while international institutions (Mean = 1.74, SD = 0.452) exhibit slightly higher participation.

The perceived importance of IL for academic success is consistently high across all categories, with mean scores around 3.93, indicating strong recognition of IL's role in education. Self-rated IL skills show minimal variation, with public and private university respondents scoring an average of 3.25, while international university respondents report a slightly lower mean of 3.16. Overall, the findings suggest that while IL awareness and participation are relatively uniform, there is room for further engagement and skill development across university categories (Table 4.33).

**Table 4.33: Descriptive statistics of awareness towards IL (University category)**

|                                                                                        |              | No.        | Mean        | SD          | Std. Error  | 95% Confidence Interval for Mean |             | Min      | Max      |
|----------------------------------------------------------------------------------------|--------------|------------|-------------|-------------|-------------|----------------------------------|-------------|----------|----------|
|                                                                                        |              |            |             |             |             | Lower Bound                      | Upper Bound |          |          |
| Are you aware of the Information Literacy programs offered by your university library? | Public       | 214        | 1.70        | .689        | .047        | 1.60                             | 1.79        | 1        | 3        |
|                                                                                        | Private      | 206        | 1.71        | .672        | .047        | 1.62                             | 1.80        | 1        | 3        |
|                                                                                        | Intl.        | 19         | 1.89        | .737        | .169        | 1.54                             | 2.25        | 1        | 3        |
|                                                                                        | <b>Total</b> | <b>439</b> | <b>1.71</b> | <b>.683</b> | <b>.033</b> | <b>1.65</b>                      | <b>1.77</b> | <b>1</b> | <b>3</b> |
| Have you ever participated in any IL programs or workshops offered by the library?     | Public       | 214        | 1.73        | .446        | .030        | 1.67                             | 1.79        | 1        | 2        |
|                                                                                        | Private      | 206        | 1.69        | .462        | .032        | 1.63                             | 1.76        | 1        | 2        |
|                                                                                        | Intl.        | 19         | 1.74        | .452        | .104        | 1.52                             | 1.95        | 1        | 2        |
|                                                                                        | <b>Total</b> | <b>439</b> | <b>1.71</b> | <b>.453</b> | <b>.022</b> | <b>1.67</b>                      | <b>1.76</b> | <b>1</b> | <b>2</b> |
| How important do you think IL is for your academic success?                            | Public       | 214        | 3.94        | .788        | .054        | 3.83                             | 4.05        | 1        | 5        |
|                                                                                        | Private      | 206        | 3.91        | .798        | .056        | 3.80                             | 4.02        | 1        | 5        |
|                                                                                        | Intl.        | 19         | 3.95        | .621        | .143        | 3.65                             | 4.25        | 3        | 5        |
|                                                                                        | <b>Total</b> | <b>439</b> | <b>3.93</b> | <b>.785</b> | <b>.037</b> | <b>3.85</b>                      | <b>4.00</b> | <b>1</b> | <b>5</b> |
| How would you rate your own Information Literacy skills?                               | Public       | 214        | 3.25        | .978        | .067        | 3.12                             | 3.38        | 1        | 5        |
|                                                                                        | Private      | 206        | 3.25        | 1.00        | .070        | 3.11                             | 3.39        | 1        | 5        |
|                                                                                        | Intl.        | 19         | 3.16        | .898        | .206        | 2.72                             | 3.59        | 1        | 5        |
|                                                                                        | <b>Total</b> | <b>439</b> | <b>3.24</b> | <b>.987</b> | <b>.047</b> | <b>3.15</b>                      | <b>3.34</b> | <b>1</b> | <b>5</b> |

Table 4.34 describes the ANOVA results indicating no statistically significant differences in user awareness, participation, perceived importance, or self-rated IL skills across university categories. The significance values for awareness of IL programs ( $p = 0.479$ ), participation in IL workshops ( $p = 0.715$ ), perceived importance of IL for academic success ( $p = 0.935$ ), and self-rated IL skills ( $p = 0.928$ ) all exceed the 0.05 threshold, confirming the absence of significant variation. This suggests that IL awareness, engagement, and perceptions are consistent among public, private, and international university users, reinforcing the need for universal IL strategies rather than institution-specific interventions.

**Table 4.34: ANOVA on user awareness** (*University category*)

|                                                                                        |                | Sum of Squares | df         | Mean Square | F    | Sig. |
|----------------------------------------------------------------------------------------|----------------|----------------|------------|-------------|------|------|
| Are you aware of the Information Literacy programs offered by your university library? | Between Groups | .689           | 2          | .344        | .738 | .479 |
|                                                                                        | Within Groups  | 203.571        | 437        | .466        |      |      |
|                                                                                        | <b>Total</b>   | <b>204.260</b> | <b>439</b> |             |      |      |
| Have you ever participated in any IL programs or workshops offered by the library?     | Between Groups | .138           | 2          | .069        | .336 | .715 |
|                                                                                        | Within Groups  | 89.698         | 437        | .205        |      |      |
|                                                                                        | <b>Total</b>   | <b>89.836</b>  | <b>439</b> |             |      |      |
| How important do you think IL is for your academic success?                            | Between Groups | .083           | 2          | .041        | .067 | .935 |
|                                                                                        | Within Groups  | 269.585        | 437        | .617        |      |      |
|                                                                                        | <b>Total</b>   | <b>269.667</b> | <b>439</b> |             |      |      |
| How would you rate your own Information Literacy skills?                               | Between Groups | .146           | 2          | .073        | .075 | .928 |
|                                                                                        | Within Groups  | 426.774        | 437        | .978        |      |      |
|                                                                                        | <b>Total</b>   | <b>426.920</b> | <b>439</b> |             |      |      |

Table 4.35 presents awareness, participation, perceived importance, and self-rated IL skills across different user categories. Faculties show the highest awareness (Mean = 1.25) and participation (Mean = 1.21) in IL programs, while research students (PhD and MPhil) and Masters students exhibit moderate awareness and engagement. Honor's students report the lowest IL awareness (Mean = 1.83) but higher participation (Mean = 1.80) compared to research students. Regarding IL's importance for academic success, faculties rate it the highest (Mean = 4.92), followed by PhD researchers (Mean = 4.13), while honors students give the lowest rating (Mean = 3.77). Faculties also rate their IL skills the highest (Mean = 4.38), whereas Honor's students report the lowest self-rating (Mean = 3.01). The findings indicate

that faculty members and researchers acknowledge IL's value more than students, suggesting a need for enhanced IL awareness and skill development programs for students, particularly at the undergraduate level.

**Table 4.35: Descriptive statistics of awareness towards IL (User category)**

|                                                                                        | User category       | No.        | Mean        | SD          | Std. Error  | 95% Confidence Interval for Mean |             | Min      | Max      |
|----------------------------------------------------------------------------------------|---------------------|------------|-------------|-------------|-------------|----------------------------------|-------------|----------|----------|
|                                                                                        |                     |            |             |             |             | Lower Bound                      | Upper Bound |          |          |
| Are you aware of the Information Literacy programs offered by your university library? | Faculty             | 48         | 1.25        | .668        | .096        | 1.06                             | 1.44        | 1        | 3        |
|                                                                                        | PhD                 | 8          | 1.88        | .991        | .350        | 1.05                             | 2.70        | 1        | 3        |
|                                                                                        | Researcher MPhil    | 10         | 1.90        | .994        | .314        | 1.19                             | 2.61        | 1        | 3        |
|                                                                                        | Researcher Master's | 55         | 1.38        | .561        | .076        | 1.23                             | 1.53        | 1        | 3        |
|                                                                                        | Student             | 318        | 1.83        | .639        | .036        | 1.76                             | 1.90        | 1        | 3        |
|                                                                                        | Honor's Student     | 318        | 1.83        | .639        | .036        | 1.76                             | 1.90        | 1        | 3        |
|                                                                                        | <b>Total</b>        | <b>439</b> | <b>1.71</b> | <b>.683</b> | <b>.033</b> | <b>1.65</b>                      | <b>1.77</b> | <b>1</b> | <b>3</b> |
| Have you ever participated in any IL programs or workshops offered by the library?     | Faculty             | 48         | 1.21        | .410        | .059        | 1.09                             | 1.33        | 1        | 2        |
|                                                                                        | PhD                 | 8          | 1.75        | .463        | .164        | 1.36                             | 2.14        | 1        | 2        |
|                                                                                        | Researcher MPhil    | 10         | 1.70        | .483        | .153        | 1.35                             | 2.05        | 1        | 2        |
|                                                                                        | Researcher Master's | 55         | 1.67        | .474        | .064        | 1.54                             | 1.80        | 1        | 2        |
|                                                                                        | Student             | 318        | 1.80        | .404        | .023        | 1.75                             | 1.84        | 1        | 2        |
|                                                                                        | Honor's Student     | 318        | 1.80        | .404        | .023        | 1.75                             | 1.84        | 1        | 2        |
|                                                                                        | <b>Total</b>        | <b>439</b> | <b>1.71</b> | <b>.453</b> | <b>.022</b> | <b>1.67</b>                      | <b>1.76</b> | <b>1</b> | <b>2</b> |
| How important do you think IL is for your academic success?                            | Faculty             | 48         | 4.92        | .347        | .050        | 4.82                             | 5.02        | 3        | 5        |
|                                                                                        | PhD                 | 8          | 4.13        | .641        | .227        | 3.59                             | 4.66        | 3        | 5        |
|                                                                                        | Researcher MPhil    | 10         | 3.80        | .632        | .200        | 3.35                             | 4.25        | 3        | 5        |
|                                                                                        | Researcher Master's | 55         | 3.98        | .652        | .088        | 3.81                             | 4.16        | 3        | 5        |
|                                                                                        | Student             | 318        | 3.77        | .751        | .042        | 3.68                             | 3.85        | 1        | 5        |
|                                                                                        | Honor's Student     | 318        | 3.77        | .751        | .042        | 3.68                             | 3.85        | 1        | 5        |
|                                                                                        | <b>Total</b>        | <b>439</b> | <b>3.93</b> | <b>.785</b> | <b>.037</b> | <b>3.85</b>                      | <b>4.00</b> | <b>1</b> | <b>5</b> |
| How would you rate your own Information Literacy skills?                               | Faculty             | 48         | 4.38        | .640        | .092        | 4.19                             | 4.56        | 3        | 5        |
|                                                                                        | PhD                 | 8          | 3.50        | .926        | .327        | 2.73                             | 4.27        | 2        | 4        |
|                                                                                        | Researcher MPhil    | 10         | 3.60        | .843        | .267        | 3.00                             | 4.20        | 2        | 5        |
|                                                                                        | Researcher Master's | 55         | 3.49        | .791        | .107        | 3.28                             | 3.70        | 2        | 5        |
|                                                                                        | Student             | 318        | 3.01        | .936        | .053        | 2.91                             | 3.12        | 1        | 5        |
|                                                                                        | Honor's Student     | 318        | 3.01        | .936        | .053        | 2.91                             | 3.12        | 1        | 5        |
|                                                                                        | <b>Total</b>        | <b>439</b> | <b>3.24</b> | <b>.987</b> | <b>.047</b> | <b>3.15</b>                      | <b>3.34</b> | <b>1</b> | <b>5</b> |

The ANOVA analysis reveals significant differences in IL awareness, participation, perceived importance, and self-rated skills among different user categories. The p-values for all four variables are .000, indicating strong statistical significance. Awareness of IL programs ( $F=12.443$ ), participation in IL workshops ( $F=20.877$ ), perceived importance of IL for academic success ( $F=28.286$ ), and self-rated IL skills ( $F=26.410$ ) all show notable variation across user groups. These results suggest that IL awareness and engagement levels differ significantly among faculties, researchers, and students, highlighting the need for targeted IL initiatives to bridge these gaps (Table 4.36).

**Table 4.36: ANOVA on awareness towards IL (User category)**

|                                                                                        |                | Sum of Squares | df  | Mean Square | F      | Sig.         |
|----------------------------------------------------------------------------------------|----------------|----------------|-----|-------------|--------|--------------|
| Are you aware of the Information Literacy programs offered by your university library? | Between Groups | 21.015         | 4   | 5.254       | 12.443 | <b>.000*</b> |
|                                                                                        | Within Groups  | 183.244        | 435 | .421        |        |              |
|                                                                                        | Total          | 204.260        | 439 |             |        |              |
| Have you ever participated in any IL programs or workshops offered by the library?     | Between Groups | 14.496         | 4   | 3.624       | 20.877 | <b>.000*</b> |
|                                                                                        | Within Groups  | 75.340         | 435 | .173        |        |              |
|                                                                                        | Total          | 89.836         | 439 |             |        |              |
| How important do you think IL is for your academic success?                            | Between Groups | 55.764         | 4   | 13.941      | 28.286 | <b>.000*</b> |
|                                                                                        | Within Groups  | 213.903        | 435 | .492        |        |              |
|                                                                                        | Total          | 269.667        | 439 |             |        |              |
| How would you rate your own Information Literacy skills?                               | Between Groups | 83.575         | 4   | 20.894      | 26.410 | <b>.000*</b> |
|                                                                                        | Within Groups  | 343.345        | 435 | .789        |        |              |
|                                                                                        | Total          | 426.920        | 439 |             |        |              |

#### 4.2.7.4 Assessing the satisfaction level on IL services

##### 4.2.7.4.1 Satisfaction level on workshop and seminar

Table 4.37 shows that most of the respondents, 41.4%, are satisfied with the workshops and seminars. In comparison, 12.3% are very satisfied and 14.4% are highly satisfied, indicating a strong positive perception of 68.2% toward these programs. However, 22.1% are less satisfied, and 9.8% are not satisfied, suggesting that nearly one-third of users feel improvements are needed. These findings highlight the need to enhance workshop content, delivery methods, and engagement strategies to ensure greater user satisfaction and effectiveness in IL programs.

**Table 4.37: Satisfaction level on workshop and seminar**

|                  | Frequency | Percent | Cumulative % |
|------------------|-----------|---------|--------------|
| Not satisfied    | 43        | 9.8     | 9.8          |
| Less satisfied   | 97        | 22.1    | 31.9         |
| Satisfied        | 182       | 41.4    | 73.3         |
| Very satisfied   | 54        | 12.3    | 85.6         |
| Highly satisfied | 63        | 14.4    | 100.0        |
| Total            | 439       | 100.0   |              |

#### 4.2.7.4.2 Satisfaction level on training on the research program

Table 4.38 indicates that a majority of respondents, 46.3% are satisfied with the training on research programs, while 16.2% are very satisfied and 13.4% are highly satisfied, bringing the total positive response to 75.8%. However, 22.3% are less satisfied, and 1.8% is not satisfied, suggesting that nearly a quarter of users see room for improvement. The findings emphasize the overall effectiveness of research training programs but also highlight the need for further enhancements in training content, methodology, and accessibility to ensure broader user satisfaction.

**Table 4.38: Satisfaction level on training in the research program**

|                  | Frequency | Percent | Cumulative % |
|------------------|-----------|---------|--------------|
| Not satisfied    | 8         | 1.8     | 1.8          |
| Less satisfied   | 98        | 22.3    | 24.1         |
| Satisfied        | 203       | 46.3    | 70.4         |
| Very satisfied   | 71        | 16.2    | 86.6         |
| Highly satisfied | 59        | 13.4    | 100.0        |
| Total            | 439       | 100.0   |              |

#### 4.2.7.4.3 Satisfaction level on the consultancy program

Table 4.39 reveals a mixed level of satisfaction regarding the consultancy program. While 69.5% of respondents expressed satisfaction, with 26.7% satisfied, 18.9% very satisfied, and 23.9% highly satisfied, a significant 30.5% were less satisfied or not satisfied. This suggests that although the program is appreciated by many, there is a notable portion of users who find it lacking. Improvements in consultation services, availability, and customization to user needs could help enhance overall satisfaction.

**Table 4.39: Satisfaction level on the consultancy program**

|                  | Frequency | Percent | Cumulative % |
|------------------|-----------|---------|--------------|
| Not satisfied    | 12        | 2.7     | 2.7          |
| Less satisfied   | 122       | 27.8    | 30.5         |
| Satisfied        | 117       | 26.7    | 57.2         |
| Very satisfied   | 83        | 18.9    | 76.1         |
| Highly satisfied | 105       | 23.9    | 100.0        |
| Total            | 439       | 100.0   |              |

#### 4.2.7.4.4 Satisfaction level with the IL programs

The overall satisfaction level with the IL programs provided by the library shows that a majority of users 57.7% are satisfied, with 44.8% satisfied and 12.8% very satisfied. However, 39.2% remain neutral, indicating that they neither find the programs particularly beneficial nor inadequate. Only a small fraction 3.2% expressed dissatisfaction (Table 4.40). This suggests that while IL programs are generally well-received, there is room for improvement to make them more engaging and effective. Enhancing program relevance, accessibility, and user engagement strategies may help increase satisfaction levels.

**Table 4.40: Rating of overall satisfaction level with IL programs by library**

|                   | Frequency | Percent | Cumulative % |
|-------------------|-----------|---------|--------------|
| Very dissatisfied | 4         | .9      | .9           |
| Dissatisfied      | 10        | 2.3     | 3.2          |
| Neutral           | 172       | 39.2    | 42.4         |
| Satisfied         | 197       | 44.8    | 87.2         |
| Very satisfied    | 56        | 12.8    | 100.0        |
| Total             | 439       | 100.0   |              |

#### 4.2.7.4.5 Variance in satisfaction level (University categories)

Table 4.41 presents user satisfaction levels across different IL initiatives in public, private, and international universities.

1. *Workshops and seminars*: Private university users reported slightly higher satisfaction (Mean = 3.03) than public (Mean = 2.97) and international universities (Mean = 2.89), though overall satisfaction remains moderate (Mean = 2.99).
2. *Training on research programs*: Private university users had the highest satisfaction (Mean = 3.25), followed by public universities (Mean = 3.13), while international users expressed lower satisfaction (Mean = 2.79).

3. *Library orientation programs*: Public and private university users show relatively high satisfaction (Mean = 3.41 and 3.46, respectively), whereas international universities report significantly lower satisfaction (Mean = 2.68).
4. *Online literacy programs*: Both public (Mean = 3.29) and private universities (Mean = 3.35) have moderate satisfaction, while international universities rate it the lowest (Mean = 2.37).
5. *Consultancy programs*: Public and private universities report equal satisfaction (Mean = 3.36), while international university users show lower satisfaction (Mean = 2.74).

Overall, private and public university users exhibit relatively higher satisfaction across all IL initiatives, whereas international university users consistently report lower satisfaction, highlighting potential gaps in IL services for international students.

**Table 4.41: Descriptive satisfaction on IL initiatives (University category)**

|                                                        |         | No. | Mean | SD    | Std. error | 95% Confidence interval for mean |             | Min. | Max. |
|--------------------------------------------------------|---------|-----|------|-------|------------|----------------------------------|-------------|------|------|
|                                                        |         |     |      |       |            | Lower bound                      | Upper bound |      |      |
| Satisfaction level on Workshop and seminar             | Public  | 214 | 2.97 | 1.144 | .078       | 2.81                             | 3.12        | 1    | 5    |
|                                                        | Private | 206 | 3.03 | 1.177 | .082       | 2.87                             | 3.19        | 1    | 5    |
|                                                        | Intl.   | 19  | 2.89 | .809  | .186       | 2.50                             | 3.28        | 2    | 5    |
|                                                        | Total   | 439 | 2.99 | 1.146 | .055       | 2.89                             | 3.10        | 1    | 5    |
| Satisfaction level on Training on the research program | Public  | 214 | 3.13 | 1.011 | .069       | 2.99                             | 3.26        | 1    | 5    |
|                                                        | Private | 206 | 3.25 | .944  | .066       | 3.12                             | 3.38        | 2    | 5    |
|                                                        | Intl.   | 19  | 2.79 | 1.032 | .237       | 2.29                             | 3.29        | 2    | 5    |
|                                                        | Total   | 439 | 3.17 | .984  | .047       | 3.08                             | 3.26        | 1    | 5    |
| Satisfaction level on Library orientation program      | Public  | 214 | 3.41 | 1.015 | .069       | 3.27                             | 3.54        | 1    | 5    |
|                                                        | Private | 206 | 3.46 | 1.024 | .071       | 3.32                             | 3.60        | 1    | 5    |
|                                                        | Intl.   | 19  | 2.68 | 1.057 | .242       | 2.17                             | 3.19        | 1    | 5    |
|                                                        | Total   | 439 | 3.40 | 1.031 | .049       | 3.30                             | 3.50        | 1    | 5    |
| Satisfaction level on Online literacy program          | Public  | 214 | 3.29 | 1.311 | .090       | 3.11                             | 3.47        | 1    | 5    |
|                                                        | Private | 206 | 3.35 | 1.416 | .099       | 3.16                             | 3.55        | 1    | 5    |
|                                                        | Intl.   | 19  | 2.37 | 1.212 | .278       | 1.78                             | 2.95        | 1    | 5    |
|                                                        | Total   | 439 | 3.28 | 1.369 | .065       | 3.15                             | 3.41        | 1    | 5    |
| Satisfaction level on Consultancy program              | Public  | 214 | 3.36 | 1.197 | .082       | 3.20                             | 3.52        | 1    | 5    |
|                                                        | Private | 206 | 3.36 | 1.189 | .083       | 3.20                             | 3.53        | 1    | 5    |
|                                                        | Intl.   | 19  | 2.74 | 1.098 | .252       | 2.21                             | 3.27        | 1    | 5    |
|                                                        | Total   | 439 | 3.33 | 1.193 | .057       | 3.22                             | 3.45        | 1    | 5    |

The ANOVA results (Table 4.42) reveal that satisfaction levels across different IL initiatives vary among university categories. No significant differences are found in satisfaction levels for workshops and seminars ( $p = 0.798$ ), training on research programs ( $p = 0.095$ ), and consultancy programs ( $p = 0.082$ ), suggesting relatively consistent perceptions across institutions. Library orientation programs ( $p = 0.007$ ) and online literacy programs ( $p = 0.011$ ) show statistically significant differences, indicating that university type influences satisfaction in these areas. This suggests that while most IL initiatives are perceived similarly, targeted improvements may be needed in orientation and online literacy programs to address institutional differences.

**Table 4.42: ANOVA on satisfaction level (University category)**

|                                                        |                | Sum of squares | df  | Mean square | F.    | Sig.  |
|--------------------------------------------------------|----------------|----------------|-----|-------------|-------|-------|
| Satisfaction level on Workshop and seminar             | Between Groups | .594           | 2   | .297        | .225  | .798  |
|                                                        | Within Groups  | 574.386        | 437 | 1.314       |       |       |
|                                                        | Total          | 574.979        | 439 |             |       |       |
| Satisfaction level on Training on the research program | Between Groups | 4.562          | 2   | 2.281       | 2.370 | .095  |
|                                                        | Within Groups  | 419.625        | 437 | .960        |       |       |
|                                                        | Total          | 424.187        | 439 |             |       |       |
| Satisfaction level on Library orientation program      | Between Groups | 10.396         | 2   | 5.198       | 4.983 | .007* |
|                                                        | Within Groups  | 454.843        | 437 | 1.041       |       |       |
|                                                        | Total          | 465.239        | 439 |             |       |       |
| Satisfaction level on Online literacy program          | Between Groups | 16.948         | 2   | 8.474       | 4.598 | .011* |
|                                                        | Within Groups  | 803.590        | 437 | 1.839       |       |       |
|                                                        | Total          | 820.538        | 439 |             |       |       |
| Satisfaction level on Consultancy program              | Between Groups | 7.104          | 2   | 3.552       | 2.511 | .082  |
|                                                        | Within Groups  | 616.673        | 437 | 1.411       |       |       |
|                                                        | Total          | 623.777        | 439 |             |       |       |

The Kruskal-Wallis test (Table 4.43) examined differences in satisfaction with IL initiatives across university categories. Results indicate a statistically significant difference ( $\chi^2 = 8.424$ ,  $df = 2$ ,  $p = .015$ ). Mean rank values show that respondents from public universities (222.99) and private universities (224.47) reported higher satisfaction compared to those from international universities (137.87). This suggests that IL programs in public and private universities are perceived more favorably, while international universities lag behind in user satisfaction.

**Table 4.43: Kruskal-Wallis test ranks<sup>a</sup>**

|                                                     | University category | N   | Mean rank             |
|-----------------------------------------------------|---------------------|-----|-----------------------|
| Satisfaction                                        | Public              | 214 | 222.99                |
|                                                     | Private             | 206 | 224.47                |
|                                                     | International       | 19  | 137.87                |
|                                                     | Total               | 439 |                       |
| Chi-Square                                          |                     |     | Satisfaction<br>8.424 |
| df                                                  |                     |     | 2                     |
| Asymp. Sig.                                         |                     |     | .015                  |
| <sup>a</sup> Kruskal-Wallis test                    |                     |     |                       |
| <sup>b</sup> Grouping Variable: University category |                     |     |                       |

The descriptive analysis of satisfaction levels across user categories indicates that faculty members consistently report the highest satisfaction across all IL initiatives, particularly in workshops and seminars (Mean = 4.38), consultancy programs (Mean = 4.40), and online literacy programs (Mean = 4.29). PhD and MPhil researchers show moderate satisfaction, with scores generally between 3.00 and 3.75, while Masters and Honors 'students have lower satisfaction levels, particularly for workshops (Mean = 2.85, 2.80), online literacy programs (Mean = 2.69, 3.23), and consultancy programs (Mean = 3.64, 3.13). The findings suggest that faculty members perceive IL initiatives more positively, whereas students, especially undergraduates, may require better-targeted support to enhance their satisfaction with these programs (Table 4.44).

**Table 4.44: Descriptive statistics on satisfaction level (User category)**

|                                                        | User category | No.        | Mean        | Std. deviation | Std. Error  | 95% Confidence interval for mean |             | Min.     | Max.     |
|--------------------------------------------------------|---------------|------------|-------------|----------------|-------------|----------------------------------|-------------|----------|----------|
|                                                        |               |            |             |                |             | Lower bound                      | Upper bound |          |          |
| Satisfaction level on Workshop and seminar             | Faculty       | 48         | 4.38        | .841           | .121        | 4.13                             | 4.62        | 3        | 5        |
|                                                        | PhD Res.      | 8          | 3.00        | .535           | .189        | 2.55                             | 3.45        | 2        | 4        |
|                                                        | MPhil Res.    | 10         | 3.40        | .699           | .221        | 2.90                             | 3.90        | 2        | 4        |
|                                                        | Master's      | 55         | 2.85        | .931           | .126        | 2.60                             | 3.11        | 2        | 5        |
|                                                        | Honor's       | 318        | 2.80        | 1.097          | .062        | 2.67                             | 2.92        | 1        | 5        |
|                                                        | <b>Total</b>  | <b>439</b> | <b>2.99</b> | <b>1.146</b>   | <b>.055</b> | <b>2.89</b>                      | <b>3.10</b> | <b>1</b> | <b>5</b> |
| Satisfaction level on Training on the research program | Faculty       | 48         | 4.23        | .831           | .120        | 3.99                             | 4.47        | 3        | 5        |
|                                                        | PhD Res.      | 8          | 3.13        | .835           | .295        | 2.43                             | 3.82        | 2        | 4        |
|                                                        | MPhil Res.    | 10         | 3.40        | .516           | .163        | 3.03                             | 3.77        | 3        | 4        |
|                                                        | Master's      | 55         | 3.20        | .848           | .114        | 2.97                             | 3.43        | 2        | 5        |
|                                                        | Honor's       | 318        | 3.00        | .943           | .053        | 2.90                             | 3.10        | 1        | 5        |
|                                                        | <b>Total</b>  | <b>439</b> | <b>3.17</b> | <b>.984</b>    | <b>.047</b> | <b>3.08</b>                      | <b>3.26</b> | <b>1</b> | <b>5</b> |

|                                                   | User category | No.        | Mean        | Std. deviation | Std. Error  | 95% Confidence interval for mean |             | Min.     | Max.     |
|---------------------------------------------------|---------------|------------|-------------|----------------|-------------|----------------------------------|-------------|----------|----------|
|                                                   |               |            |             |                |             | Lower bound                      | Upper bound |          |          |
| Satisfaction level on Library orientation program | Faculty       | 48         | 3.94        | .561           | .081        | 3.77                             | 4.10        | 3        | 5        |
|                                                   | PhD Res.      | 8          | 3.75        | .463           | .164        | 3.36                             | 4.14        | 3        | 4        |
|                                                   | MPhil Res.    | 10         | 3.40        | .516           | .163        | 3.03                             | 3.77        | 3        | 4        |
|                                                   | Master's      | 55         | 3.55        | .919           | .124        | 3.30                             | 3.79        | 1        | 5        |
|                                                   | Honor's       | 318        | 3.28        | 1.096          | .061        | 3.16                             | 3.40        | 1        | 5        |
|                                                   | <b>Total</b>  | <b>439</b> | <b>3.40</b> | <b>1.031</b>   | <b>.049</b> | <b>3.30</b>                      | <b>3.50</b> | <b>1</b> | <b>5</b> |
| Satisfaction level on Online literacy program     | Faculty       | 48         | 4.29        | .922           | .133        | 4.02                             | 4.56        | 2        | 5        |
|                                                   | PhD Res.      | 8          | 3.38        | .518           | .183        | 2.94                             | 3.81        | 3        | 4        |
|                                                   | MPhil Res.    | 10         | 3.20        | .789           | .249        | 2.64                             | 3.76        | 2        | 5        |
|                                                   | Master's      | 55         | 2.69        | 1.200          | .162        | 2.37                             | 3.02        | 1        | 5        |
|                                                   | Honor's       | 318        | 3.23        | 1.406          | .079        | 3.07                             | 3.38        | 1        | 5        |
|                                                   | <b>Total</b>  | <b>439</b> | <b>3.28</b> | <b>1.369</b>   | <b>.065</b> | <b>3.15</b>                      | <b>3.41</b> | <b>1</b> | <b>5</b> |
| Satisfaction level on Consultancy program         | Faculty       | 48         | 4.40        | .869           | .125        | 4.14                             | 4.65        | 2        | 5        |
|                                                   | PhD Res.      | 8          | 3.25        | 1.035          | .366        | 2.38                             | 4.12        | 2        | 5        |
|                                                   | MPhil Res.    | 10         | 3.20        | .919           | .291        | 2.54                             | 3.86        | 2        | 5        |
|                                                   | Master's      | 55         | 3.64        | 1.007          | .136        | 3.36                             | 3.91        | 1        | 5        |
|                                                   | Honor's       | 318        | 3.13        | 1.186          | .066        | 3.00                             | 3.26        | 1        | 5        |
|                                                   | <b>Total</b>  | <b>439</b> | <b>3.33</b> | <b>1.193</b>   | <b>.057</b> | <b>3.22</b>                      | <b>3.45</b> | <b>1</b> | <b>5</b> |

The ANOVA results on user category satisfaction levels reveal significant differences across groups for all IL initiatives ( $p < 0.05$  for all tests). The highest F-values are observed for workshops and seminars ( $F = 24.745$ ,  $p = .000$ ) and training on research programs ( $F = 19.149$ ,  $p = .000$ ), indicating substantial variations in satisfaction levels. Similarly, consultancy programs ( $F = 14.326$ ,  $p = .000$ ) and online literacy programs ( $F = 9.987$ ,  $p = .000$ ) also show significant group differences. The library orientation program ( $F = 4.966$ ,  $p = .001$ ), while still significant, exhibits comparatively lower variation. These findings suggest that different user groups perceive IL initiatives differently, with faculty members showing higher satisfaction than students, particularly undergraduates, who may require more tailored support and improvements in these initiatives (Table 4.45).

**Table 4.45: ANOVA on satisfaction level (User categories)**

|                                                          |                | Sum of squares | df         | Mean square | F      | Sig.         |
|----------------------------------------------------------|----------------|----------------|------------|-------------|--------|--------------|
| Satisfaction level on the Workshop and seminar           | Between Groups | 106.779        | 5          | 21.360      | 24.745 | <b>.000*</b> |
|                                                          | Within Groups  | 468.200        | 434        | 1.079       |        |              |
|                                                          | <b>Total</b>   | <b>574.979</b> | <b>439</b> |             |        |              |
| Satisfaction level with training on the research program | Between Groups | 63.633         | 5          | 12.727      | 19.149 | <b>.000*</b> |
|                                                          | Within Groups  | 360.554        | 434        | .831        |        |              |
|                                                          | <b>Total</b>   | <b>424.187</b> | <b>439</b> |             |        |              |
| Satisfaction level on the library orientation program    | Between Groups | 20.362         | 5          | 4.072       | 4.966  | <b>.001*</b> |
|                                                          | Within Groups  | 444.877        | 434        | 1.025       |        |              |
|                                                          | <b>Total</b>   | <b>465.239</b> | <b>439</b> |             |        |              |
| Satisfaction level on the online literacy program        | Between Groups | 69.158         | 5          | 13.832      | 9.987  | <b>.000*</b> |
|                                                          | Within Groups  | 751.379        | 434        | 1.731       |        |              |
|                                                          | <b>Total</b>   | <b>820.538</b> | <b>439</b> |             |        |              |
| Satisfaction level on Consultancy program                | Between Groups | 72.756         | 5          | 14.551      | 14.326 | <b>.000*</b> |
|                                                          | Within Groups  | 551.020        | 434        | 1.270       |        |              |
|                                                          | <b>Total</b>   | <b>623.777</b> | <b>439</b> |             |        |              |

#### 4.2.7.5 Impact of IL on academic and SDGs

##### 4.2.7.5.1 Impact of the library's IL programs

Table 4.46 shows that the impact of the library's IL programs on academic work is generally positive, with 56.9% of users acknowledging some level of benefit, 35.5% stating it helps "to some extent," and 21.4% "to a great extent." However, a significant portion 32.6% remains neutral, indicating that they do not perceive a clear impact. Meanwhile, 10.5% find the programs of little or no help. These findings highlight the need to improve IL programs to align them with users' academic needs better. Enhancing practical applications, increasing awareness, and offering more targeted support could improve their effectiveness.

**Table 4.46: Assistance of the library's IL programs in academic work**

|                   | Frequency | Percent | Cumulative % |
|-------------------|-----------|---------|--------------|
| Not at all        | 7         | 1.6     | 1.6          |
| Very little       | 39        | 8.9     | 10.5         |
| Neutral           | 143       | 32.6    | 43.1         |
| To some extent    | 156       | 35.5    | 78.6         |
| To a great extent | 94        | 21.4    | 100.0        |
| Total             | 439       | 100.0   |              |

#### 4.2.7.5.2 Applicability of IL skills beyond academic life

The applicability of IL skills beyond academic life is recognized by a majority 59.2% of respondents, with 32.3% stating they are “definitely” useful and 26.9% believing they are “somewhat” applicable in career, personal decision-making, and community involvement. However, 31.2% remain unsure, suggesting a lack of awareness about the broader benefits of IL skills. A small proportion, 9.6% does not find these skills relevant beyond academia (Table 4.47). These findings indicate the need for more practical demonstrations and real-world applications of IL skills to help users recognize their value in professional and everyday contexts.

**Table 4.47: Application of IL skills beyond academic life**

|                 | Frequency | Percent | Cumulative % |
|-----------------|-----------|---------|--------------|
| No, not at all  | 21        | 4.8     | 4.8          |
| No, not really  | 21        | 4.8     | 9.6          |
| Not sure        | 137       | 31.2    | 40.8         |
| Yes, somewhat   | 118       | 26.9    | 67.7         |
| Yes, definitely | 142       | 32.3    | 100.0        |
| Total           | 439       | 100.0   |              |

#### 4.2.7.5.3 Role of IL in contributing to broader societal goals

Table 4.48 presents the majority of respondents 73.1% recognize the role of IL in contributing to broader societal goals, such as those outlined in the SDGs. Among them, 31.4% strongly believe in IL’s impact, while 41.7% acknowledge it to some extent. However, 26.2% remain unsure, indicating a gap in awareness regarding IL’s role in addressing societal challenges. Only 0.7% dismisses its relevance. These findings highlight the need for more awareness initiatives and practical demonstrations of how IL programs align with SDG objectives, emphasizing their broader significance beyond academic settings.

**Table 4.48: Belief in IL contribution to broader societal goals in the SDGs**

|                | Frequency | Percent | Cumulative % |
|----------------|-----------|---------|--------------|
| No, not really | 3         | .7      | .7           |
| Not sure       | 115       | 26.2    | 26.9         |
| Yes, somewhat  | 183       | 41.7    | 68.6         |
| Yes, strongly  | 138       | 31.4    | 100.0        |
| Total          | 439       | 100.0   |              |

#### 4.2.7.5.4 Descriptive statistics on the impact of IL on SDG

The descriptive statistics indicate a positive perception of the impact of IL programs on SDGs. Among 439 respondents, the highest mean score (4.04, SD = 0.777) is associated with the belief that IL contributes to broader societal goals, highlighting strong agreement with IL's relevance to SDGs. Respondents also acknowledge the applicability of IL skills beyond academic life (Mean = 3.77, SD = 1.099) and their usefulness in academic work (Mean = 3.66, SD = 0.963). Overall, the data reflect a generally favorable view of IL's contribution to both personal and societal development aligned with SDGs (Table 4.49).

**Table 4.49: Item statistics on the impact of IL program on SDGs**

|                                                                                                                                                            | Mean | SD    | N.  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-----|
| To what extent have the library's IL programs helped you in your academic work?                                                                            | 3.66 | .963  | 439 |
| Do you think the IL skills you have learned are applicable beyond your academic life (e.g., in your career, personal decisions, or community involvement)? | 3.77 | 1.099 | 439 |
| Do you believe that IL contributes to broader societal goals such as those outlined in the SDGs?                                                           | 4.04 | .777  | 439 |

The summary item statistics show that the average responses across the three items assessing the impact of IL on SDGs are consistently high, with a mean of 3.83. The item means range from 3.66 to 4.04, indicating relatively strong agreement across all questions. The range is 0.376, suggesting low variability in respondents' perceptions. The maximum/minimum ratio of 1.103 and low variance (0.037) reflect consistency in responses, reinforcing that participants perceive IL programs as having a meaningful and stable impact on academic success, life beyond academia, progress toward achieving the SDGs (Table 4.50).

**Table 4.50: Summary item statistics**

|            | Mean  | Minimum | Maximum | Range | Max./Mini. | Variance | No. of items |
|------------|-------|---------|---------|-------|------------|----------|--------------|
| Item means | 3.825 | 3.663   | 4.039   | .376  | 1.103      | .037     | 3            |

The ANOVA results on the impact of IL programs in achieving SDGs reveal a statistically significant difference among the item means ( $F = 26.396$ ,  $p = .000$ ), indicating that respondents perceived varying levels of impact across different aspects of IL. The grand mean of 3.82 suggests an overall positive impact of IL's contribution to academic success, applicability in broader life contexts, and alignment with SDG objectives. The significant result justifies that IL programs are viewed as meaningful tools for supporting sustainable development, thus supporting the hypothesis that IL contributes to SDG progress (Table 4.51).

**Table 4.51: ANOVA on the impact of IL program on achieving SDGs**

|                   |               | Sum of squares | df   | Mean square | F.     | Sig   |
|-------------------|---------------|----------------|------|-------------|--------|-------|
| Between people    |               | 656.744        | 439  | 1.496       |        |       |
| Within            | Between items | 32.815         | 2    | 16.408      | 26.396 | .000* |
| People            | Residual      | 544.518        | 876  | .622        |        |       |
|                   | Total         | 577.333        | 878  | .658        |        |       |
| Total             |               | 1232.483       | 1316 | .937        |        |       |
| Grand mean = 3.82 |               |                |      |             |        |       |

#### 4.2.7.6 Challenges and obstacles

##### 4.2.7.6.1 Challenges in developing IL skills

Table 4.52 presents a descriptive analysis of the challenges faced by library users in developing their IL skills. The most significant obstacles include inadequate support from library staff (Mean = 3.78, SD = 1.353) and lack of awareness of IL programs (Mean = 3.76, SD = 1.139). Lack of time (Mean = 3.55, SD = 1.131) and difficulty accessing IL resources (Mean = 3.40, SD = 0.960) are also notable concerns. A lower mean score of 3.26 (SD = 1.286) indicates that while some users feel IL programs do not meet their needs, this is a relatively less severe challenge compared to others. The negative skewness in most variables suggests that a larger proportion of respondents rated these challenges on the higher end of the scale.

**Table 4.52: Descriptive statistics on challenges in developing IL skills**

| Challenges                                  | No.           | Min.          | Max.          | Sum           | Mean          | SD            | Skewness      | Kurtosis      |               |               |
|---------------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                                             | Statis<br>tic | Statis<br>tic | Statis<br>tic | Statis<br>tic | Statis<br>tic | Statis<br>tic | Statis<br>tic | Std.<br>error | Statist<br>ic | Std.<br>error |
| Lack of fund<br>and time                    | 439           | 1             | 5             | 1560          | 3.55          | 1.131         | -.438         | .117          | -.467         | .233          |
| Lack of<br>awareness of<br>IL programs      | 439           | 1             | 5             | 1650          | 3.76          | 1.139         | -.791         | .117          | -.073         | .233          |
| IL programs<br>not meeting<br>my needs      | 439           | 1             | 5             | 1432          | 3.26          | 1.286         | -.272         | .117          | -.963         | .233          |
| Difficulty<br>accessing IL<br>resources     | 439           | 1             | 5             | 1494          | 3.40          | .960          | -.633         | .117          | .400          | .233          |
| Inadequate<br>support from<br>library staff | 439           | 1             | 5             | 1659          | 3.78          | 1.353         | -.883         | .117          | -.427         | .233          |
| Valid N (listwise) 439                      |               |               |               |               |               |               |               |               |               |               |

The summary item statistics on challenges in developing IL skills show that the average mean score across the five items is 3.55, indicating a moderate to high level of agreement that these are real challenges. The mean values range from 3.26 to 3.78, with a range of 0.517, suggesting relatively consistent perceptions among respondents. The maximum/minimum ratio of 1.159 and a variance of 0.050 further confirm that the challenges are similarly rated, with only slight variation. This consistency underscores that issues like lack of support, awareness, and time are commonly experienced barriers to building IL skills (Table 4.53).

**Table 4.53: Summary item statistics on challenges in developing IL skills**

|            | Mean  | Min   | Max   | Range | Max/ Min | Variance | Items |
|------------|-------|-------|-------|-------|----------|----------|-------|
| Item means | 3.551 | 3.262 | 3.779 | .517  | 1.159    | .050     | 5     |

The ANOVA results on challenges in developing IL skills for achieving SDGs reveal statistically significant differences in respondents' perceptions across the listed issues ( $F = 23.528$ ,  $p = .000$ ). With a grand mean of 3.55, the data indicate a moderate to high concern overall, particularly regarding inadequate library staff support, lack of awareness, and limited time.

The significant variation in responses highlights that these challenges are not equally felt, suggesting that certain barriers, especially institutional and resource-based are more prominent. This supports the assertion that inadequate funding, lack of awareness and infrastructural support are critical obstacles to the effective development and implementation of IL programs aligned with the SDGs (Table 4.54).

**Table 4.54: ANOVA on challenges in developing IL skills for attaining SDGs**

|                   |               | Sum of Squares | df   | Mean Square | F      | Sig   |
|-------------------|---------------|----------------|------|-------------|--------|-------|
| Between People    |               | 1423.677       | 439  | 3.243       |        |       |
| Within            | Between Items | 88.009         | 4    | 22.002      | 23.528 | .000* |
| People            | Residual      | 1638.391       | 1752 | .935        |        |       |
|                   | Total         | 1726.400       | 1756 | .983        |        |       |
| Total             |               | 3146.984       | 2194 | 1.434       |        |       |
| Grand Mean = 3.55 |               |                |      |             |        |       |

#### 4.2.7.7 Enhancing the accessibility and effectiveness of IL programs

Table 4.55 presents a descriptive analysis of suggested improvements to make IL programs more accessible and beneficial for students. The highest-rated recommendations include customizing IL programs to meet diverse user needs (Mean = 4.28, SD = 0.743) and providing consultation services (Mean = 4.26, SD = 0.815). Offering online and on-demand IL programs (Mean = 4.24, SD = 0.803) is also seen as a highly effective strategy.

Additionally, integrating IL into the academic curriculum (Mean = 4.00, SD = 0.946) and increasing awareness campaigns (Mean = 4.02, SD = 0.914) are widely supported suggestions. The negative skewness values indicate that respondents predominantly rated these suggestions on the higher end of the scale, demonstrating strong agreement.

**Table 4.55: Descriptive statistics on strategies to improve IL accessibility**

| Strategies                                     | No.            | Min.           | Max.           | Sum            | Mean           | SD             | Skewness       | Kurtosis      |                |               |
|------------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|----------------|---------------|
|                                                | Statis-<br>tic | Statis-<br>tic | Statis-<br>tic | Statis-<br>tic | Statist-<br>ic | Statis-<br>tic | Statis-<br>tic | Std.<br>error | Statis-<br>tic | Std.<br>error |
| Offer IL programs online and on-demand         | 439            | 1              | 5              | 1857           | 4.24           | .803           | -.780          | .117          | .019           | .233          |
| Integrate IL into the academic curriculum      | 439            | 1              | 5              | 1758           | 4.00           | .946           | -1.26          | .117          | 2.05           | .233          |
| Increase promotion and awareness campaigns     | 439            | 1              | 5              | 1766           | 4.02           | .914           | -.893          | .117          | .311           | .233          |
| Customize IL programs for different user needs | 439            | 1              | 5              | 1877           | 4.28           | .743           | -.828          | .117          | .732           | .233          |
| Provide consultation services                  | 439            | 1              | 5              | 1871           | 4.26           | .815           | -.718          | .117          | -.288          | .233          |
| Valid N ( <i>listwise</i> )                    | 439            |                |                |                |                |                |                |               |                |               |

### 4.2.7.8 Perception of library support

#### 4.2.7.8.1 Support from library staff in developing IL skills

Table 4.56 presents respondents' perceptions of library staff support in developing their IL skills. A significant portion of respondents 46.0% find library staff supportive, while 20.3% find them very supportive. However, 22.3% remain neutral, and a smaller group 11.4% express dissatisfaction with the support received.

**Table 4.56: Perceived support from library staff in IL skill development**

|                   | Frequency | Percent | Cumulative % |
|-------------------|-----------|---------|--------------|
| Very unsupportive | 17        | 3.9     | 3.9          |
| Unsupportive      | 33        | 7.5     | 11.4         |
| Neutral           | 98        | 22.3    | 33.7         |
| Supportive        | 202       | 46.0    | 79.7         |
| Very supportive   | 89        | 20.3    | 100.0        |
| Total             | 439       | 100.0   |              |

### 4.2.7.9 Additional services or resources for enhancing IL skills

Table 4.57 presents respondents' preferences for additional services or resources to enhance their IL skills. The highest-rated suggestion is collaboration spaces for group study and IL practice (Mean = 4.25, SD = 0.719), closely followed by access to interactive IL tutorials and online courses (Mean = 4.22, SD = 0.716). Other notable recommendations include advanced IL workshops and seminars (Mean = 4.17, SD = 0.775) and regular IL newsletters or updates (Mean = 4.07, SD = 0.826).

#### *Summary of findings*

- i. Collaboration spaces (Mean = 4.25) receive the highest preference, indicating students value interactive and peer-supported learning environments.
- ii. Online IL tutorials (Mean = 4.22) are highly favored, reflecting a demand for flexible and accessible learning resources.
- iii. Advanced IL workshops (Mean = 4.17) are also in high demand, showing the need for in-depth training opportunities.
- iv. A dedicated IL support desk or chat service (Mean = 3.95) receive relatively lower support, though still considered beneficial.

**Table 4.57: Descriptive statistics on preferred additional services for enhancing IL skills**

| Services or resources                                 | No. | Min. | Max. | Sum  | Mean | SD   |
|-------------------------------------------------------|-----|------|------|------|------|------|
| Advanced IL workshops and seminars                    | 439 | 2    | 5    | 1832 | 4.17 | .775 |
| Access to interactive IL tutorials and online courses | 439 | 2    | 5    | 1851 | 4.22 | .716 |
| Dedicated IL support desk or chat service             | 439 | 1    | 5    | 1734 | 3.95 | .990 |
| Regular IL newsletters or update                      | 439 | 2    | 5    | 1787 | 4.07 | .826 |
| Collaboration spaces for group study and IL practice  | 439 | 2    | 5    | 1866 | 4.25 | .719 |
| Valid N ( <i>listwise</i> )                           | 439 |      |      |      |      |      |

**4.2.7.10 Gaps in library resources for promoting IL programs aligned with SDGs**

Table 4.58 highlights key resource gaps that hinder the promotion of IL programs aimed at supporting the SDGs. The most significant challenge identified is institutional support and collaboration with other departments (Mean = 3.90, SD = 1.088), followed by technological infrastructure (Mean = 3.82, SD = 1.160).

**Key findings**

- i. Institutional support and collaboration (Mean = 3.90) are the most lacking resources, indicating a need for better partnerships within the university.
- ii. Technological infrastructure (Mean = 3.82) is a major gap, suggesting the need for improved digital tools and software to support IL initiatives.
- iii. Limited trained personnel (Mean = 3.76) and financial resources (Mean = 3.75) are significant barriers, highlighting the need for investment in staff training and budget allocation.
- iv. Educational materials tailored to SDGs (Mean = 3.71) are insufficient, pointing to the necessity of targeted resources to bridge the knowledge gap.
- v. User engagement (Mean = 3.75) is also a concern, indicating a need for strategies to increase student participation in IL programs.

**Table 4.58: Descriptive statistics on most lacking resources**

| Lacking                                                        | No. | Min. | Max. | Sum  | Mean | SD    |
|----------------------------------------------------------------|-----|------|------|------|------|-------|
| Financial resources and budget allocation                      | 439 | 1    | 5    | 1647 | 3.75 | 1.087 |
| Trained personnel with expertise in both IL and SDGs           | 439 | 1    | 5    | 1650 | 3.76 | 1.056 |
| Technological infrastructure (e.g., software, digital tools)   | 439 | 1    | 5    | 1679 | 3.82 | 1.160 |
| Educational materials and resources tailored to SDGs           | 439 | 1    | 5    | 1628 | 3.71 | 1.159 |
| Institutional support and collaboration with other departments | 439 | 1    | 5    | 1713 | 3.90 | 1.088 |
| User engagement and participation                              | 439 | 1    | 5    | 1648 | 3.75 | 1.026 |
| Valid N ( <i>listwise</i> )                                    | 439 |      |      |      |      |       |

#### 4.2.7.11 Perceived effectiveness of IL strategies for achieving SDGs in university libraries of Bangladesh

Table 4.59 reflects mixed perceptions regarding the effectiveness of existing IL strategies and resources in university libraries of Bangladesh for supporting the SDGs.

##### Key findings

- i. Only 13.7% of respondents consider the strategies very effective, while 17.7% find them somewhat effective, indicating that a minority see the current IL initiatives as impactful.
- ii. A significant portion 28.2% remains neutral, suggesting uncertainty or lack of awareness regarding the effectiveness of IL programs.
- iii. A concerning 40.4% of respondents feel IL strategies are lacking, with 26.7% rating them as somewhat lacking and 13.7% as very lacking.

**Table 4.59: Perceived effectiveness of IL strategies for SDGs**

|                    | Frequency | Percent | Cumulative % |
|--------------------|-----------|---------|--------------|
| Very effective     | 60        | 13.7    | 13.7         |
| Somewhat effective | 78        | 17.7    | 31.4         |
| Neutral            | 124       | 28.2    | 59.7         |
| Somewhat lacking   | 117       | 26.7    | 86.3         |
| Very lacking       | 60        | 13.7    | 100.0        |
| Total              | 439       | 100.0   |              |

#### 4.2.7.12 Recommendations and best practices

##### 4.2.7.12.1 Recommendations for improving IL programs in university libraries

Table 4.60 presents key suggestions made by respondents for enhancing IL programs in university libraries. The responses indicate strong support for better collaboration, customization, resource expansion, and promotion of IL initiatives.

##### *Key findings*

- i. Effective promotion (Mean: 4.31) – The highest-rated suggestion is to promote IL programs more effectively, indicating that awareness and outreach strategies need improvement.
- ii. Collaboration with faculty (Mean: 4.27) – Strengthening partnerships between librarians and faculties are crucial to making IL more relevant to academic needs.
- iii. Expanding IL resources (Mean: 4.08) – There is a strong demand for a wider range of IL materials and learning formats to support diverse learning preferences.
- iv. Tailoring IL programs (Mean: 3.99) – Customizing IL programs based on specific academic disciplines can enhance relevance and engagement.
- v. Flexible scheduling (Mean: 3.97) – Offering more flexible training schedules can improve accessibility for students with busy academic commitments.
- vi. Regular feedback mechanisms (Mean: 3.92) – Implementing feedback-driven improvements ensures IL programs align with user expectations.

**Table 4.60: Descriptive statistics on specific suggestions made by respondents**

| Suggestions                                           | No. | Min. | Max. | Sum  | Mean | SD    |
|-------------------------------------------------------|-----|------|------|------|------|-------|
| Tailor IL programs to specific academic disciplines   | 439 | 1    | 5    | 1752 | 3.99 | .811  |
| Increase collaboration between librarians and faculty | 439 | 1    | 5    | 1875 | 4.27 | 1.008 |
| Expand the variety of IL resources and materials      | 439 | 1    | 5    | 1793 | 4.08 | .881  |
| Implement regular feedback mechanisms                 | 439 | 1    | 5    | 1722 | 3.92 | .818  |
| Offer more flexible scheduling and formats            | 439 | 1    | 5    | 1743 | 3.97 | .783  |
| Promote IL programs more effectively                  | 439 | 1    | 5    | 1893 | 4.31 | .788  |
| Valid N ( <i>listwise</i> )                           | 439 |      |      |      |      |       |

4.2.7.12.2 *Enhancing library contributions to personal and academic development*

Table 4.61 presents respondents' preferences for how libraries can better support personal and academic development through IL initiatives. The responses emphasize the importance of mentorship, career-focused resources, and peer learning opportunities.

*Key findings*

- i. IL success stories and best practices (Mean: 4.18) – The highest-rated suggestion highlights the need for a repository of IL success stories and best practices, which can inspire and guide students in applying IL skills effectively.
- ii. Specialized IL resources for career development (Mean: 4.17) – There is a strong demand for career-oriented IL materials to help students transition from academics to the professional world.
- iii. Integrating IL into academic mentorship (Mean: 4.13) – Embedding IL within academic advising and mentoring programs can improve its long-term impact on students.
- iv. Peer-to-peer learning (Mean: 4.11) – Creating student-driven learning communities can enhance IL engagement through collaborative learning.
- v. IL workshops and events (Mean: 3.96) – Hosting thematic workshops can provide interactive, hands-on learning experiences.
- vi. Personalized IL coaching (Mean: 3.67) – One-on-one customized IL coaching could address individual learning needs more effectively.

**Table 4.61: Descriptive statistics on preferred ways of better contribution**

| Way of better contribution                                   | No. | Min. | Max. | Sum  | Mean | SD    |
|--------------------------------------------------------------|-----|------|------|------|------|-------|
| Provide personalized IL coaching sessions                    | 439 | 1    | 5    | 1612 | 3.67 | 1.138 |
| Integrate IL into an academic advising and mentoring program | 439 | 1    | 5    | 1814 | 4.13 | .756  |
| Host IL-themed workshops and events                          | 439 | 1    | 5    | 1739 | 3.96 | .984  |
| Create a repository of IL success stories and best practices | 439 | 1    | 5    | 1833 | 4.18 | .810  |
| Facilitate peer-to-peer learning and support groups          | 439 | 1    | 5    | 1806 | 4.11 | .874  |
| Offer specialized IL resources for career development        | 439 | 1    | 5    | 1832 | 4.17 | .775  |
| Valid N ( <i>listwise</i> )                                  | 439 |      |      |      |      |       |

#### 4.2.7.13 Impact of IL activity on achieving SDGs

For assessing the impact of IL initiatives on achieving the UN SDGs, the author examined the professionals' and users' responses under the correlation analysis test. For testing the hypotheses, reliability and correlational analyses were performed below:

##### 4.2.7.13.1 Reliability analysis

To ensure the consistency and reliability of the dataset, reliability test was conducted. This is one of the general techniques to define the scale in the Likert questions in a questionnaire method. Table 4.62 shows the descriptive statistics and Cronbach's for the seven variables taken in the study model.

All of the study's variables had internal consistency values greater than 0.70. According to Pallant (2020), an Alpha Cronbach value below 0.6 is regarded as low. Alpha Cronbach readings between 0.60 and 0.80 are regarded as acceptable yet moderate. Cronbach's Alpha is generally good if it is .70 or higher, better if it is .80 or higher, and best if it is .90 or higher. Every Cronbachs Alpha value was higher than moderate. Our scales' great reliability was confirmed by the high Cronbach Alpha values.

**Table 4.62: Descriptive statistics and Cronbach's Alpha ( $\alpha$ )**

| Variables                                   | Item | Mean<br>(1-5 scale) | SD     | Reliability<br>(Cronbach's $\alpha$ ) |
|---------------------------------------------|------|---------------------|--------|---------------------------------------|
| IL promotional activity                     | 5    | 3.5500              | .45855 | .774                                  |
| Relationship between IL and SDGs            | 5    | 3.8180              | .72372 | .811                                  |
| Strategic 4 key factors                     | 40   | 4.178               | 14.48  | .872                                  |
| Awareness level among users                 | 5    | 2.6486              | .34700 | .732                                  |
| Satisfaction level among users              | 6    | 3.3068              | .82403 | .846                                  |
| Impact of IL                                | 3    | 3.8246              | .70611 | .784                                  |
| Challenges/Barriers of IL in attaining SDGs | 5    | 3.5513              | .80540 | .712                                  |

##### 4.2.7.13.2 Hypothesis testing

After conducting the reliability test, hypothesis testing was done using correlation analysis and an ANOVA test. Correlation analysis is a statistical method used to measure the linear relationship between the variables and compute their association. This demonstrates the relationship between the variables and checks the association

among the variables (Schober, Boer, and Schwarte 2018). A high correlation points to a strong relationship between the two variables, while a low correlation means that the variables are weakly related. Correlational analysis in Table 4.63 shows the relationship between the IL initiatives.

The table presents descriptive statistics and reliability coefficients (Cronbach's Alpha) for key variables related to IL and SDGs. The mean scores (on a 1–5 scale) range from 2.65 to 3.82, indicating moderate to high agreement across variables. The highest mean was observed for the relationship between IL and SDGs (3.82), followed closely by the impact of IL (3.82), while awareness among users scored the lowest (2.65), suggesting a need for improvement in user engagement. All constructs showed acceptable internal consistency, with Cronbach's Alpha values ranging from 0.712 to 0.846, confirming the reliability of the measurement items.

The correlation analysis reveals several significant relationships among variables related to IL and the achievement of SDGs. IL promotional activity is positively and moderately correlated with the perceived relationship between IL and SDGs ( $r = .392$ ,  $p < .01$ ), and weakly but significantly correlated with perceived challenges ( $r = .165$ ,  $p < .05$ ), suggesting that more promotion is associated with stronger perceived relevance to SDGs and acknowledgment of existing barriers. The relationship between IL and SDGs is also weakly but significantly correlated with challenges ( $r = .170$ ,  $p < .05$ ), indicating that as IL-SDG linkage is recognized, challenges become more evident.

Awareness level shows a significant positive correlation with satisfaction ( $r = .146$ ,  $p < .01$ ) and impact ( $r = .336$ ,  $p < .01$ ), while it is negatively correlated with challenges ( $r = -.225$ ,  $p < .01$ ), implying that higher awareness may reduce perceived barriers and increase benefits. Similarly, satisfaction is strongly linked to impact ( $r = .587$ ,  $p < .01$ ), validating the role of IL in enhancing user outcomes. However, promotional activity, awareness, and impact show mostly weak or no correlation with satisfaction, indicating a gap between exposure and perceived benefit. Overall, the findings support the hypothesis that IL activities and their alignment with SDGs are interconnected and influenced by user awareness, satisfaction, and barriers.

**Table 4.63: Information literacy and achieving SDGs (Correlation analysis)**

|                                        |                 | IL<br>promotion<br>al activity | Relationship<br>between IL<br>and SDGs | Awareness<br>level<br>among<br>users | Satisfaction<br>level among<br>users | Impact<br>of IL | Challenges/<br>Barriers of<br>IL in<br>attaining<br>SDGs |
|----------------------------------------|-----------------|--------------------------------|----------------------------------------|--------------------------------------|--------------------------------------|-----------------|----------------------------------------------------------|
| IL<br>promotional<br>activity          | Pearson         | 1                              | .392**                                 | -.091                                | -.069                                | -.104           | .165*                                                    |
|                                        | Correlation     |                                |                                        |                                      |                                      |                 |                                                          |
|                                        | Sig. (2-tailed) |                                | .000                                   | .243                                 | .372                                 | .179            | .034                                                     |
|                                        | N               | 167                            | 167                                    | 167                                  | 167                                  | 167             | 167                                                      |
| Relationship<br>between IL<br>and SDGs | Pearson         | .392**                         | 1                                      | -.024                                | -.042                                | -.023           | .170*                                                    |
|                                        | Correlation     |                                |                                        |                                      |                                      |                 |                                                          |
|                                        | Sig. (2-tailed) | .000                           |                                        | .759                                 | .590                                 | .765            | .028                                                     |
|                                        | N               | 167                            | 167                                    | 167                                  | 167                                  | 167             | 167                                                      |
| Awareness<br>level among<br>users      | Pearson         | -.091                          | -.024                                  | 1                                    | .146**                               | .336**          | -.225**                                                  |
|                                        | Correlation     |                                |                                        |                                      |                                      |                 |                                                          |
|                                        | Sig. (2-tailed) | .243                           | .759                                   |                                      | .002                                 | .000            | .000                                                     |
|                                        | N               | 167                            | 167                                    | 439                                  | 439                                  | 439             | 439                                                      |
| Satisfaction<br>level among<br>users   | Pearson         | -.069                          | -.042                                  | .146**                               | 1                                    | .587**          | .017                                                     |
|                                        | Correlation     |                                |                                        |                                      |                                      |                 |                                                          |
|                                        | Sig. (2-tailed) | .372                           | .590                                   | .002                                 |                                      | .000            | .727                                                     |
|                                        | N               | 167                            | 167                                    | 439                                  | 439                                  | 439             | 439                                                      |
| Impact of IL                           | Pearson         | -.104                          | -.023                                  | .336**                               | .587**                               | 1               | -.034                                                    |
|                                        | Correlation     |                                |                                        |                                      |                                      |                 |                                                          |
|                                        | Sig. (2-tailed) | .179                           | .765                                   | .000                                 | .000                                 |                 | .473                                                     |
|                                        | N               | 167                            | 167                                    | 439                                  | 439                                  | 439             | 439                                                      |
| Challenges/<br>Barriers                | Pearson         | .165*                          | .170*                                  | -.225**                              | .017                                 | -.034           | 1                                                        |
|                                        | Correlation     |                                |                                        |                                      |                                      |                 |                                                          |
|                                        | Sig. (2-tailed) | .034                           | .028                                   | .000                                 | .727                                 | .473            |                                                          |
|                                        | N               | 167                            | 167                                    | 439                                  | 439                                  | 439             | 439                                                      |

\*\*Correlation is significant at the 0.01 level (2-tailed). \*Correlation is significant at the 0.05 level (2-tailed).

Table 4.64 presents the results of hypothesis testing summary on the impact and relationship of IL in achieving SDGs, based on multiple variables assessed through statistical measures.

**H1** which tests the *impact of uniform IL activity on SDGs*, is strongly supported by the data ( $F = 83.424$ ,  $p < .001$ ), indicating a significant variation in perceptions and confirming that lack of uniform IL practices affects SDG outcomes.

**H2** validates the *relationship between IL and SDGs* ( $F = 27.085$ ,  $p < .000$ ), affirming that IL initiatives are significantly associated with SDG progress.

**H3** though lacking an F-value, highlights that *four key strategic factors* (presumably from factor analysis) have a high mean (4.178), suggesting strong consensus on their importance in linking IL with SDG achievement.

*H4A* examines *awareness level* and shows mixed results not significant in university-level responses ( $p > 0.05$ ), but highly significant from user data ( $p < .000$ ), indicating a gap between institutional and user perspectives.

*H4B* concerning *user satisfaction*, is significant in both groups ( $p < .000$ ), confirming that satisfaction is a critical indicator of successful IL-SDG integration.

*H5* focuses on the *impact of IL* itself and is strongly supported ( $F = 26.396$ ,  $p < .000$ ), suggesting IL plays a meaningful role in achieving SDGs.

Finally, *H6* related to *challenges/barriers*, is also statistically significant ( $F = 23.528$ ,  $p < .000$ ), indicating that various challenges significantly influence the effectiveness of IL efforts in SDG contexts.

**Table 4.64: Hypotheses testing**

| Hypotheses                                                                                                                                                                                   | Items | Mean   | SD    | F Statistic/<br>P Value  | Result    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|-------|--------------------------|-----------|
| H1. There is an impact of uniform IL initiative in university libraries of Bangladesh on achieving SDGs.                                                                                     | 5     | 3.5500 | .458  | F = 83.424<br>p < .001   | Supported |
| H2. There is a relationship between promotion of IL and the progress SDGs.                                                                                                                   | 5     | 3.8180 | .723  | F= 27.085<br>p <.000     | Supported |
| H3. There are key factors of IL such as user engagement and skill development, digital literacy training, environmental well-being, and financial support that contribute to achieving SDGs. | 40    | 4.1780 | 14.48 | CFA                      | Supported |
| H4A. There is a relationship between the level of awareness and satisfaction regarding IL initiatives among universities categories.                                                         | 5     | 2.6486 | .347  | p > 0.05<br>(university) | Supported |
| H4B. There is a relationship between the level of awareness and satisfaction regarding IL initiatives among user categories.                                                                 | 6     | 3.3068 | .824  | p < .000<br>(user)       | Supported |
| H5. There is a positive impact of IL programs on achieving SDGs.                                                                                                                             | 3     | 3.8246 | .706  | F = 26.396<br>p <.000)   | Supported |
| H6. There are limitations such as inadequate funding, lack of awareness, and insufficient infrastructural support that hinder IL activities from attaining SDGs.                             | 5     | 3.5513 | .805  | F = 23.528,<br>p < .000  | Supported |

#### 4.2.7.14 Contribution to academic and personal growth and challenges

The respondents were asked in what ways they believe the library's IL programs contribute to the academic and personal growth of the university community. This section is based on responses to an open-ended question aimed at understanding how library professionals recognize the influences of their institution's IL initiatives to the academic and individual development of the university community. The collected commentary responses from library personnel were thematically evaluated to recognize key insights and outlines.

##### 4.2.7.14.1 Academic excellence, personal development, and institutional growth

The responses reflect the perspectives of participating library administrators who are actively involved in IL programs. Their insights highlight the critical role of IL initiatives in fostering academic excellence, personal development, and institutional growth. These administrators emphasize how IL programs enhance research skills, critical thinking, digital literacy, and ethical information use, ultimately benefiting students, faculties, and researchers in achieving their academic and professional goals. The responses are analyzed thematically and mentioned under 8 themes below:

- i. ***Enhancement of research and academic skills:*** IL programs empower students and faculties by enhancing research and critical thinking skills, ensuring ethical information use, and fostering academic success. They help users to complete theses, reports, and projects using authentic sources while improving digital literacy and adaptability in the evolving academic landscape (R2, R3, R9, R10, R18, R30, R41, R52, R60, R80, R101, R130).
- ii. ***Digital literacy and technological adaptability:*** IL programs play a crucial role in equipping students and faculties with essential digital skills, such as navigating e-books, databases, and repositories. Workshops on reference management software and AI-based fact-checking further support digital literacy, enabling users to evaluate digital content critically (R10, R32, R102, R167).
- iii. ***Personal growth and lifelong learning:*** IL fosters independent learning, ethical decision-making, and professional preparedness. By developing problem-solving skills and encouraging lifelong learning habits, IL programs empower individuals to expand their knowledge, make informed decisions, and prepare for their careers (R9, R12, R50, R58, R88, R123, R146).

- iv. ***Role of IL in teaching and faculty development:*** IL programs provide valuable academic resources to faculty, staff, and students, supporting effective teaching and research. They educate faculty members on plagiarism, research tools, and search techniques, helping them refine their teaching methods and promote academic excellence within institutions (R4, R17, R31, R92, R156).
- v. ***Library services and awareness:*** IL programs enhance users' awareness of university library resources, ensuring informed decision-making and effective utilization of academic materials. They also bridge the knowledge gap for students who are often unaware of subsidized resources available through university libraries (R6, R55, R56, R57, R147).
- vi. ***Integration of IL into university programs:*** Universities can integrate IL programs into academic curricula through orientations, workshops, and regular training. Research-focused IL sessions, digital literacy classes, and plagiarism awareness initiatives strengthen students' academic and research capabilities (R70, R71, R104, R144).
- vii. ***IL and SDGs:*** IL programs contribute to the United Nations Sustainable Development Goals, particularly in ensuring quality education (SDGs goal 4) and reducing inequalities. Aligning IL initiatives with SDGs help promote access to knowledge and lifelong learning opportunities (R57, R151, R162).
- viii. ***Suggestions for improvement of IL programs:*** To improve IL programs, institutions should ensure proper training and continuous follow-up for both staff and users. Year-round training sessions, better resource management, and financial support enhance program sustainability. Additionally, IL initiatives should focus on career readiness, problem-solving, and research skill enhancement while leveraging digital platforms for accessibility (R14, R34, R35, R38, R113, R157, R160, R165).

#### *4.2.7.14.2 Challenges in designing IL programs and their effects*

What challenges do you encounter in designing or delivering IL programs and how do these challenges affect program outcomes? Eighty respondents provided their valuable insights regarding the challenges they encounter in designing or delivering IL programs, and how these challenges affect program outcomes. Designing and delivering IL programs presents various challenges that impact their effectiveness and

outcomes. IL programs aim to equip learners with essential research and critical thinking skills, yet factors such as resource constraints, technological barriers, diverse learner needs, and institutional limitations hinder their success. Based on responses from 80 participants, this study explores the key challenges faced in IL program development and implementation. The thematic analysis of challenges in designing IL programs and their effects are mentioned below:

- i) **Resource and budget constraints:** A significant challenge in IL program implementation is the lack of financial support, skilled human resources, and technological resources. Many institutions in Bangladesh face funding limitations that restrict program development, infrastructure enhancement, and faculty training (R3, R4, R8, R22, R30, R36, R60, R61, R62, R74, R106, R116, R121, R132, R133, R144, R161).
- ii) **Low Student and faculty engagement:** Many students and faculty members lack awareness or interest in IL programs. Some students fail to see the relevance of IL training, while faculty members may not integrate IL into their courses (R10, R17, R21, R37, R40, R64, R85, R105, R146, R147, R157).
- iii) **Institutional and policy limitations:** Limited institutional support, lack of IL policies, and weak collaboration between faculties and librarians create barriers to successful program execution (R9, R12, R16, R17, R31, R66, R109, R117, R141, R143, R150, R165).
- iv) **Time Constraints and curriculum integration challenges:** Balancing IL sessions with academic coursework is a challenge, as students and faculty members often struggle to allocate time for IL training within their already packed schedules (R7, R10, R65, R67, R81, R83, R104, R107).
- v) **Technological barriers and digital divide:** Many institutions face issues such as inadequate digital infrastructure, lack of access to electronic resources, and varying levels of digital literacy among students (R32, R50, R76, R81, R99, R104, R106, R121, R151, R152, R155, R167).
- vi) **Diverse learner needs and information overload:** Students come from different academic backgrounds, skill levels, and learning preferences, making it difficult to design a one-size-fits-all IL curriculum. Additionally, the rapid evolution of information sources creates challenges in filtering misinformation (R2, R11, R16, R50, R99, R151, R152, R165).

- vii) ***Lack of awareness and motivation:*** Many students are unaware of the importance of IL and do not actively seek IL training. Additionally, faculty members may not encourage students to participate in IL programs (R31, R54, R78, R105, R123, R129, R147, R150, R158).
- viii) ***Sustainability and adaptability issues:*** The rapidly changing information landscape requires continuous updates to IL programs, but institutions often struggle to adapt due to financial and structural limitations (R2, R16, R17, R38, R50, R67, R84, R96, R131, R167).

The insights gathered highlight the difficulties in faculty collaboration, student engagement, funding, human resources, and digital access, all of which affect the reach and impact of IL initiatives. Institutions and policymakers can work toward more effective and sustainable IL programs by understanding these challenges. The challenges in designing and delivering IL programs range from financial and institutional limitations to engagement and technological barriers. These issues affect program effectiveness, resulting in reduced participation, inconsistent learning outcomes, and a lack of long-term sustainability. Addressing these obstacles requires increased institutional support, better resource allocation, curriculum integration, and tailored approaches to accommodate diverse learners.

#### **4.2.7.15 Recommendation for enhancing the role of the library**

The library professionals are requested to provide suggestions and insights to enhance the role of university libraries in Bangladesh in achieving the SDGs through IL. The responses are analyzed thematically. The study finds six major themes in recommendations. The thematic recommendations for enhancing the role of university libraries in achieving SDGs through IL are stated below:

##### ***4.2.7.15.1 Strengthening IL programs and Integration into curriculum***

- a) Introduce mandatory IL courses within academic curricula (R30, R104, R143).
- b) Align IL programs with specific SDGs such as Quality Education (SDGs goal 4), Gender Equality (goal 5), and Climate Action (goal 13) (R121, R131).
- c) Promote thinking and digital literacy to enhance research skills (R16, R50).
- d) Ensure IL programs reach underserved communities beyond university campuses (R30, R165).

*4.2.7.15.2 Collaboration and networking for SDG-focused IL*

- a) Partnership with local and international organizations such as IFLA, ALA, NGOs, and government bodies for IL-driven SDG awareness (R10, R17, R104, R132).
- b) Establish workshop and seminar partnerships with neighboring universities (R3).
- c) Foster collaborations between faculties, researchers, and policymakers to drive SDG-focused research (R9, R67).

*4.2.7.15.3 Promoting research, open access and digital inclusion*

- a) Enhance open access resources to improve accessibility and support SDG-driven research (R21, R67).
- b) Develop specialized SDG-focused repositories and digital collections (R11, R64).
- c) Encourage research sharing among university communities to advance SDG-related knowledge (R3, R9).
- d) Promote media and digital literacy to counter misinformation and enable informed decision-making (R99, R165).

*4.2.7.15.4 Capacity building and infrastructure development*

- a) Allocate separate budgets for IL programs to ensure sustainable growth (R66, R111).
- b) Provide training for library staff to enhance service quality and SDG-oriented literacy programs (R66, R123).
- c) Improve library infrastructure to support digital access and research (R132, R150).
- d) Recruit skilled library professionals for effective implementation of IL programs (R34, R35, R77).

*4.2.7.15.5 User awareness, community engagement and outreach*

- a) Conduct regular IL awareness campaigns to engage students, faculties, and external communities (R37, R40, R105).
- b) Organize SDG-related workshops, training, and skill enrichment programs (R36, R55, R106).
- c) Encourage lifelong learning by making IL an ongoing educational initiative (R21, R50).

- d) Support environmental initiatives such as tree planting and climate awareness programs (R102).

#### *4.2.7.15.6 Institutional support and policy advocacy*

- a) Secure institutional backing to integrate IL into university policies and strategies (R22, R133).
- b) To sustain long-term IL initiatives, advocate for funding and policy development (R38, R74).
- c) Establish evaluation metrics to measure the impact of IL programs on SDG progress (R21, R143).

By implementing these recommendations, university libraries in Bangladesh can play a transformative role in achieving SDGs through IL and developing a knowledgeable, sustainable and informed society.

#### **4.2.7.16 Extended analysis of users' recommendations**

University library users have provided a wide range of suggestions to improve library services, particularly in alignment with IL and SDGs. The recommendations can be categorized into several key areas: digital transformation, inclusivity and accessibility, SDG awareness and sustainability, educational and skill development programs, user engagement, infrastructure improvement, and library policy enhancements.

##### *4.2.7.16.1 Digital transformation and e-resource expansion*

A significant number of users emphasize the need to modernize library services through digitalization, expanded e-resources, and improved internet accessibility. Key suggestions in this category include:

- a) Enhancing digital access to books, journals, and databases for research and education (R280, R269, R322).
- b) Implementing a digital library system where users can check book availability online (R304).
- c) Ensuring free access to digital and physical resources, research databases, and internet services to bridge the digital divide (R268, R269).
- d) Improving computer facilities and Wi-Fi connectivity, particularly in discussion rooms and study areas (R170, R358).

- e) Providing online courses and e-learning platforms to help students develop skills remotely (R438).

These digital transformations aim to enhance knowledge accessibility and promote lifelong learning, directly supporting SDGs goal 4 (Quality Education).

#### *4.2.7.16.2 Inclusivity and accessibility*

Users highlight the importance of ensuring that library services are accessible to all individuals, including those with disabilities and marginalized groups. Key recommendations include:

- a) Creating inclusive spaces for individuals with impairments and ensuring libraries are physically and digitally accessible (R215, R438).
- b) Providing materials in multiple languages, not just in Bangla, to cater to diverse users (R438).
- c) Expanding access for marginalized communities by offering outreach programs and specialized services (R221, R223).
- d) Offering personalized IL coaching sessions tailored to individual needs (R256).

By addressing accessibility concerns, libraries can promote equal opportunities for knowledge acquisition and participation, aligning with SDGs goal 10 (Reduced Inequalities).

#### *4.2.7.16.3 SDG Awareness and sustainability initiatives*

Libraries play a crucial role in advancing sustainability, environmental awareness, and SDG-related education. Users recommended as:

- a) Hosting sustainability-focused events, exhibitions, and discussions (R27, R28, R37).
- b) Creating SDG resource hubs to provide structured access to sustainability-related information (R28, R53).
- c) Collaborating with environmental organizations and local stakeholders to organize workshops and community action projects (R240, R407).
- d) Promoting eco-friendly practices in library management, such as green libraries and energy-efficient infrastructure (R85, R204).

These initiatives enhance environmental consciousness while fostering a culture of sustainability within academic and local communities, aligning with SDGs goal 13 (Climate Action).

#### *4.2.7.16.4 Educational and skill development programs*

Many users stress the need for more structured educational and skill-building programs in libraries. Their suggestions include:

- a) Organizing digital literacy programs and career development workshops (R28, R85, R357).
- b) Offering entrepreneurship training and job-related skill development courses (R85, R388).
- c) Providing vocational training and community education initiatives (R28, R62).
- d) Strengthening IL programs by integrating them into academic curricula (R148, R204).
- e) Enhancing IL awareness through user-friendly tutorials, guides, and librarianship training (R230, R384).

By focusing on knowledge empowerment, these initiatives bridge the skills gap and support students' professional growth, reinforcing SDGs goal 8 (Decent Work and Economic Growth).

#### *4.2.7.16.5 User engagement and community outreach*

To improve library-user interaction and engagement, users suggested:

- a) Making libraries more student-friendly and interactive (R11, R350).
- b) Encouraging faculty collaborations to increase IL engagement (R27, R134).
- c) Hosting awareness campaigns, discussion sessions, and competitions to boost user participation (R20, R357).
- d) Strengthening partnerships with governmental bodies, NGOs, and global networks for funding and research collaborations (R218).
- e) Turning libraries into community hubs where knowledge-sharing and SDG advocacy can thrive (R142, R65).

This increases engagement fosters a stronger academic and social learning culture, promoting SDGs goal 17 (Partnerships for the Goals).

#### *4.2.7.16.6 Infrastructure and library environment improvement*

Users pointed out infrastructural shortcomings and suggested various enhancements:

- a) Expanding library spaces to accommodate more students (R437).
- b) Providing more discussion rooms for group study (R358).

- c) Ensuring a quiet and distraction-free library environment (R385).
- d) Adding more computers and modern facilities for student's use (R194).
- e) Upgrading library aesthetics to create more comfortable and inspiring study atmosphere (R194).

A well-maintained and resourceful library enhances user experience and academic productivity.

#### *4.2.7.16.7 Library policy enhancements and staff training*

To improve library governance and service delivery, users suggested:

- a) Aligning library strategies with university and national SDG frameworks for long-term impact (R109, R223).
- b) Ensuring librarians' proper training in modern IL techniques (R238, R384).
- c) Providing better incentives and salaries for skilled librarians to retain qualified professionals (R137).
- d) Enforcing proper staff behavior and improving communication skills (R130).

By adopting these strategies, libraries can operate more efficiently and effectively, contributing to SDGs goal 16 (Peace, Justice, and Strong Institutions).

### **4.3 Summary of the data analysis**

The study provides valuable insights into the effectiveness, challenges, and future improvements of IL programs in university libraries in Bangladesh. The findings reveal that while a significant portion of users are satisfied with IL programs, there are notable areas for improvement. Workshops and seminars are received mixed responses, with 68.2% expressing satisfaction, whereas consultancy programs had lower approval, indicating a need for more tailored services. In terms of academic impact, 56.9% found IL programs beneficial, while 43.1% remained neutral or unimpressed, highlighting the need for greater relevance and engagement. Additionally, while the majority percent believed IL skills were applicable beyond academics, a considerable percent were uncertain, suggesting a gap in real-world applicability. Encouragingly, 73.1% agreed that IL supports societal goals like the SDGs, underlining its potential broader impact.

The hypothesis tests confirm most assumptions of the study. Hypothesis 1 and 2 are strongly supported ( $p < .001$ ,  $p < .000$ ), indicating significant variation in IL practices

and a clear relationship between IL and SDGs. Hypothesis 3 highlights the relevance of strategic factors with a high mean (4.1780). H4A shows user-level awareness is significant ( $p < .000$ ), though not at the institutional level ( $p > 0.05$ ). H4B on satisfaction is supported ( $p < .000$ ). Hypothesis 5 confirms the positive impact of IL ( $p < .000$ ), while Hypothesis 6 identifies significant challenges in IL implementation ( $p < .000$ ). Overall, the results validate IL's importance and barriers in achieving SDGs.

Challenges to IL skill development were also evident. Major barriers included lack of time, insufficient awareness of IL programs, inadequate support from library staff, and difficulties accessing IL resources. These findings suggest that better outreach, flexible scheduling, and personalized support are necessary to improve user engagement. To enhance IL accessibility and effectiveness, users emphasized online and on-demand programs, customized IL sessions and consultation services as preferred improvements. Moreover, while majority of users found library staff supportive, a portion felt otherwise, suggesting inconsistencies in service delivery.

Regarding additional resources, users expressed strong interest in interactive IL tutorials, dedicated IL support desks, and collaboration spaces to facilitate learning. However, resource gaps remain significant, particularly in financial support, trained IL-SDG personnel, technological infrastructure, and institutional collaboration. When evaluating the effectiveness of IL strategies for SDGs, a small portion considered them effective. In contrast, a majority portion believed they were lacking, pointing to the need for policy enhancements and stronger institutional backing.

To improve IL programs, users suggested greater collaboration between faculties and librarians, expansion of IL resources, regular feedback mechanisms, and more flexible scheduling. Effective promotion of IL programs was also highlighted as a key factor in increasing participation. In terms of the library's role in personnel and academic development, users strongly supported initiatives such as creating a repository of IL success stories, offering career-focused IL resources, facilitating peer learning, and integrating IL into academic mentoring.

Finally, the study revealed the insights of library professionals so that the university libraries in Bangladesh can enhance their role in achieving SDGs through IL by

integrating IL into curricula, promoting digital literacy, and fostering collaboration with academic institutions, policymakers, and international organizations. They should also conduct workshops, training, and awareness programs while ensuring adequate funding, skilled human resources, and technological advancements to support sustainable research and lifelong learning. Additionally, libraries must expand their outreach to underserved communities, promote open-access resources, and regularly assess the impact of IL initiatives to align with national and global development goals.

#### **4.4 Chapter summary**

Overall, the findings indicate that IL programs in university libraries have a positive impact but require strategic improvements to enhance accessibility, relevance, and engagement. Strengthening faculty-librarian collaboration, offering flexible and personalized training, increasing promotional efforts, and addressing resource limitations are crucial steps in maximizing the effectiveness of IL programs. By implementing these improvements, university libraries can play a transformative role in fostering IL skills for academic success, career development, and broader societal contributions, including progress toward the implementation of SDGs. In summary, the research is expected to significantly impact the IL of selected university libraries in Bangladesh by providing a better understanding of the factors that influence the adoption and implementation of IL promotional activities and by identifying the challenges and opportunities associated with the IL in achieving SDGs.

The diverse and comprehensive recommendations from library users emphasize the critical role of university libraries in promoting digital inclusion, sustainability, skill development, and community engagement. By modernizing library services, expanding accessibility, enhancing research support, and aligning with SDGs, university libraries in Bangladesh can transform into dynamic knowledge centers that empower students, researchers, and the broader community. If implemented effectively, these initiatives will significantly contribute to achieving SDGs while ensuring that university libraries remain relevant, efficient, and accessible in the digital age.

**CHAPTER FIVE  
DISCUSSION AND  
MAJOR FINDINGS**

## **CHAPTER FIVE: DISCUSSION AND MAJOR FINDINGS**

### **5.1 Introduction**

The discussion chapter provides an in-depth interpretation of the research findings, aligning them with the study's objectives, research questions, and hypotheses. This chapter critically examines how university libraries in Bangladesh contribute to achieving the Sustainable Development Goals (SDGs) through information literacy (IL) initiatives. The discussion highlights key trends, challenges, and opportunities in IL implementation by comparing the results with existing literature and theoretical frameworks. The chapter explores thematic recommendations from library professionals and users, emphasizing the role of libraries in digital transformation, inclusivity, policy development, and institutional support. Through this analysis, the study aims to provide strategic insights into strengthening IL programs and their impact on SDG attainment. This chapter also describes the key outcomes resulting from the study, along with the challenges and opportunities related to IL enterprises in university libraries in Bangladesh. The discoveries are organized based on the study's objectives, questions, and hypotheses, showing an inclusive view of how IL donates to achieving SDGs. Moreover, the chapter presents the obstacles that deter the effective execution of IL programs and recognizes opportunities for firming IL ingenuities through tactical movements and policy modifications.

### **5.2 Research overview**

#### ***5.2.1 Information of respondents (Professionals and users)***

The demographic data of library professionals (Table 4.1) indicate that the majority are from public universities 53.9%, with a significant gender disparity as male respondents 64.7% outnumber females 35.3%. Assistant Librarians 28.7% form the largest professional group, followed by Deputy Librarians 26.3%. The workforce is primarily in mid-career stages, with the 31-40 age group 40.1% being the largest, followed by the 41-45 age group 25.7%. Job experience data (Table 4.2) further supports this, showing that the majority have 11-15 years 30.5% or 16-20 years 23.4% of experience, indicating a well-experienced workforce. Educational qualifications

(Figure 4.1) reveal that 80.8% of professionals hold Master's degree, while a smaller proportion have advanced research qualifications such as PhDs 6.0% and MPhils 4.8%.

For library users, the demographic profile (Table 4.26) shows that Honor's students 72.4% form the largest group, followed by Master's students 12.5%, faculties 10.9%, and researchers pursuing MPhil 2.3% or PhD 1.9%. Public university users 48.8% slightly outnumber private university users 46.9%, while international university users constitute a small fraction 4.3%. The gender distribution is relatively balanced, with male users 55.4% slightly outnumbering females 44.6%. Age-wise, the majority 73.6% fall within the 21-25 age range, aligning with the dominance of undergraduate and postgraduate students. Library visit patterns (Table 4.27) highlight a mix of regular and occasional users, with 31.7% visiting occasionally, 27.1% daily, and 22.1% weekly. Notably, more than half of the respondents 65.8% visit at least once a week, underscoring the library's continued relevance in academic life.

### **5.3 Major findings from the printed survey questionnaire**

This section presents detailed responses to the research questions based on data collected through the structured survey questionnaires. The findings are systematically analyzed and interpreted to address each research question, offering valuable insights into the current state, challenges, and opportunities related to IL initiatives in university libraries.

RQ1: What is the current status of IL initiatives in university libraries of Bangladesh?

#### ***5.3.1 Assessment of the current status of IL initiatives***

The data reveal that IL programs have been in place for over a decade in 60.5% of libraries, reflecting a long-term commitment to IL initiatives. Additionally, 21.0% of libraries have had IL programs for 6-9 years, while 13.8% have implemented them for 4-6 years. Only a small fraction 4.8% introduced IL initiatives within the last three years, indicating that most institutions have well-established programs (Figure 4.1). In Pakistani university libraries, 63% offer IL education, primarily targeting new students with a range of basic to advanced skills. The preferred delivery method is face-to-face instruction in library training rooms, highlighting a traditional approach to IL education (Iqal and Idrees, 2021). Academic libraries in China promote IL during the pandemic by providing rapid response, reliable resources, and combating misinformation (Guo and Huang 2021).

The activities supporting IL are dominated by workshops and seminars 83.8%, followed by in-house training sessions 72.5%. Libraries also provide instructional support through teaching-learning materials 58.1% and printed guides/manuals 51.3%. However, IL integrated course modules 37.5% and research trends programs 35.0% are relatively less common (Table 4.7). Overall, libraries prioritize interactive IL activities, but there is scope for diversifying instructional methods to enhance effectiveness. Son (2024) and Aharony *et al.* (2019) also found that workshops, seminars and in-house training, the most prevalent forms of IL activities are utilized by 83.8% of libraries. They provide interactive and structured learning environments.

Regarding the perceived effectiveness of IL initiatives, a majority of respondents rated them positively, with 41.9% considering them effective and 34.7% very effective. However, 19.2% found them only moderately effective, while a small fraction 4.2% perceived them as ineffective, highlighting the need for further improvements (Figure 4.3). Most respondents view IL initiatives positively, with 41.9% considering them effective and 34.7% very effective. This suggests that these programs generally enhance IL skills among participants (Meena, 2024).

Awareness of the United Nations Sustainable Development Goals (UN SDGs) is generally strong among library professionals, with 62.2% reporting high or extreme awareness. However, 19.2% remained neutral, and 16.2% were only somewhat aware, suggesting the need for targeted awareness programs (Table 4.8). Thorpe and Gunton (2021) and Noh (2021) also revealed that while a majority of library professionals report high awareness of the SDGs, there is still a significant portion that remains neutral or only somewhat aware, indicating room for improvement in awareness initiatives.

The analysis of awareness levels across university types shows that private university professionals report the highest awareness (mean = 3.89), while public university professionals lag slightly behind (3.49). However, ANOVA results indicate these differences are not statistically significant ( $p = 0.116$ ), suggesting that the institutional category does not strongly impact SDG awareness among library professionals (Table 4.10). Studies show varying levels of awareness among library professionals about SDGs. In Ghana, library staff are generally aware of SDGs goal 4, focusing on quality education, and libraries actively engage in promoting this goal through IL programs

and relevant materials (Dei and Asante, 2022). In contrast, South Korean public librarians show limited awareness of the UN SDGs and related strategies, although they agree with the support strategies proposed by IFLA (Noh, 2021).

Based on the descriptive data, the current status of IL initiatives in Bangladeshi university libraries reveal a generally positive outlook regarding the presence and perceived quality of such programs. Respondents reported that IL programs have been in place for a considerable duration (Mean = 4.36), and the overall rating of current IL initiatives was also high (Mean = 4.07), suggesting that many university libraries are actively engaged in IL related activities. These results indicate that the practice of IL is established and considered beneficial by library professionals, highlighting its importance in supporting academic and research goals.

However, when examining the uniformity and standardization of these IL initiatives, the data suggest significant variability across institutions. The mean score for the uniformity of IL initiatives was relatively low (Mean = 2.96), and perceptions about the presence of a standardized IL structure in Bangladeshi university libraries also hovered around the neutral midpoint (Mean = 3.13). Furthermore, respondents slightly agreed that IL practices vary between public and private universities (Mean = 3.23). These findings support hypothesis H1, indicating a clear lack of coordinated and standardized IL initiatives across university libraries in Bangladesh. Without a unified national strategy or consistent institutional guidelines, the role of IL in achieving the SDGs may remain fragmented and less effective.

RQ2: How does IL relate to the achievement of UN SDGs?

### ***5.3.2 Assessment of the relationship between IL and UN SDGs***

The findings show that a significant majority of library professionals recognize the importance of understanding the UN SDGs, with 58.6% considering it very important and 23.4% rating it as extremely important. Only a small fraction of 3.0% sees it as slightly or not important, indicating a widespread institutional awareness of libraries' role in supporting SDG initiatives (Table 4.11). However, engagement levels vary, as 26.3% of professionals are actively involved, while 32.3% are moderately engaged. Meanwhile, 22.2% are only somewhat engaged, and 19.2% have minimal or no involvement, suggesting the need for increased participation in SDG-related activities (Figure 5.4). IL is seen as a cornerstone in the realization of SDGs. It is proposed as a connecting thread between the SDGs (Bruce, 2019).

The perception of IL's impact on SDGs is overwhelmingly positive, with 50.9% of respondents agreeing and 35.3% strongly agreeing that IL contributes to achieving SDGs. Only 1.2% disagree, indicating a general consensus on IL's role in sustainable development (Table 4.12). In terms of service contributions, 44.9% of professionals report moderate contributions, and 20.4% indicate significant contributions, though 19.8% remain neutral (Figure 4.5). SDGs goal 4 (Quality Education) emerges as the most impactful SDG for libraries, acknowledged by 98.8% of respondents (Table 4.17). Other notable SDGs include SDG 5 (Gender Equality) at 48.5%, SDG 17 (Partnerships for the Goals) at 38.9% and SDG 3 (Good Health and Well-being) at 38.3%. The data underscore the crucial role of libraries in promoting education, social equity, and sustainable development while also highlighting areas where further engagement and advocacy could enhance impact. Libraries provide essential resources and training to support students' learning and IL, which are key components of SDGs goal 4 (Ntsiful *et al.*, 2023; Bangani, 2023; Dei and Asante, 2022).

The analysis under RO2 (Assessing the relationship between IL and UN SDGs) and RQ2 (How does IL relate to the achievement of the UN SDGs?) presents a meaningful insight into how IL efforts within university libraries in Bangladesh align with the SDGs. The item statistics show high mean scores across all five indicators: awareness of SDGs ( $M = 3.67$ ), perceived importance of SDG understanding in libraries ( $M = 4.02$ ), engagement with SDGs ( $M = 3.51$ ), agreement on IL's impact on SDGs ( $M = 4.20$ ), and contribution to SDGs through services ( $M = 3.68$ ). These figures suggest that library professionals generally recognize and engage with SDG-related initiatives, particularly acknowledging the critical role IL plays in advancing them.

The ANOVA results further substantiate these findings. The significant F-value ( $F = 27.085$ ,  $p < 0.01$ ) indicates statistically significant differences among the items, confirming that respondents distinguish between different aspects of IL and SDG integration. The overall grand mean of 3.82 also reflects a generally favorable perception of IL's contribution to SDG achievement. These results justify the acceptance of hypothesis H2. The statistical significance confirms that IL activities in university libraries are not only aligned with the SDGs but are perceived as influential in driving their progress. Hence, the data strongly support the hypothesis and

reinforce the need for strategic promotion of IL programs as a tool for sustainable development in Bangladesh's higher education sector.

RQ3: What strategic factors can be employed by university libraries in Bangladesh to promote IL for achieving the SDGs?

### ***5.3.3 Statistical methods and factor analysis***

The quantitative analysis, conducted using SPSS Version 23 assessed IL awareness, user satisfaction, and university libraries' role in supporting SDGs. The qualitative analysis of open ended responses identified recurring themes and perceptions.

#### *5.3.3.1 Descriptive statistics, sampling adequacy and reliability test*

The study employed the Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity to determine whether the dataset was suitable for factor analysis. The KMO value of 0.797 (Table 4.18) indicates a good level of adequacy, while Bartlett's Test of Sphericity ( $p = 0.000$ ) confirms that factor analysis is appropriate. These results validate that the dataset is well-suited for identifying underlying factors. Descriptive analysis was performed to summarize key trends in IL initiatives, including measures such as mean, standard deviation, and range (Table 3.5). These insights highlight variations in participant perceptions and areas for service improvement.

The study employed Cronbach's Alpha, RHO\_A, and composite reliability measures to evaluate internal consistency. Cronbach's Alpha for the 40 item dataset was .872, with a standardized value of .916, confirming strong reliability. This ensures that the variables were measured accurately, reducing the likelihood of measurement errors. Multiple statistical techniques were applied to validate the study model, including factor analysis, Scree Plot analysis, item loadings, and commonalities (Table 3.7). The Scree Plot shows a steep decline in eigenvalues from Component 1 to Component 4, suggesting that these four factors explain most of the variance (Figure 3.2). Beyond this, the curve flattens, indicating minimal contribution from additional components. This supports the selection of a four-factor model for further analysis. These rigorous statistical methods ensure that the findings are both reliable and valid, strengthening the study's contribution to IL research in university libraries.

### *5.3.3.2 Factor analysis*

The factor analysis reveals key dimensions influencing IL programs, user engagement, institutional policies, and their role in achieving SDGs. The strongest contributions come from IL initiatives addressing No Poverty (SDG 1), Zero Hunger (SDG 2), and Climate Action (SDG 13), highlighting their significant representation in the factor structure. Four key strategic factors emerged as *User Engagement and Skill Development* (percentage of variance is 32.528, Strongest Component), *Digital Literacy Training and Resource Accessibility* (percentage of variance is 16.953), *Economic, Social and Environmental Well-being* (percentage of variance is 7.335) and *Institutional and Financial Support* (percentage of variance is 3.825). The first four components together explain 60.64% of the variance, with the strongest factor, user engagement, accounting for 32.53%. The findings indicate that while practical IL activities and SDG focused initiatives are well represented, financial and structural barriers require further institutional attention to enhance IL effectiveness in university libraries. Academic libraries' community engagement initiatives support SDGs, particularly SDGs goal 4, by providing IL skills, promoting reading and writing, and providing school supplies and computer literacy training (Bangani, 2023).

### *5.3.3.3 Individual factor analysis*

The factor analysis of IL programs highlights their critical role in promoting digital literacy, user engagement, institutional policy support, and contributions to SDGs. Promoting IL programs emerges as a key factor, with strong associations found in digital literacy training, online reference services, and workshop initiatives, emphasizing libraries' role in fostering research skills. User engagement and knowledge sharing are significantly influenced by motivation, participation, and feedback driven improvements, though community involvement remains a weaker aspect. Institutional policy and support show that collaboration with university administration, financial backing, and inclusive policies play vital roles in IL effectiveness, while financial constraints and diversity adaptation require further focus. IL's contributions to SDGs are particularly strong in poverty reduction (SDG-1), climate action (SDG-13), and digital inclusion (SDG-10), reinforcing the societal impact of IL programs. The findings underscore the necessity of strategic investments in IL initiatives, ensuring better resource allocation, enhanced engagement, and stronger institutional support to maximize their broader impact.

The results show how vital IL programs are for improving user skills, encouraging knowledge exchange, and promoting both academic and professional development. Initiatives to increase user engagement, motivation to use IL resources, and participation in IL workshops are all important factors in spreading of knowledge and developing skills. The results imply that maintaining successful IL programs requires substantial institutional support, including monetary resources and legislative frameworks. According to the report, the IL program helps achieve economic, social, and environmental goals and academic and research endeavors. In order to provide a long-lasting impact on education, professional development, and sustainable growth, IL programs can further empower students, researchers, and the community by tackling issues including financial constraints, user engagement, and accessibility to digital resources.

RQ4: What are the perceptions, levels of awareness, and satisfaction with the IL program among university library users?

#### ***5.3.4 Assessing user awareness and satisfaction level***

The analysis reveals that awareness, participation, perceived importance, and self-rated IL skills are comparable across university categories, including public, private, and international universities. Mean values indicate moderate awareness and participation, with users recognizing IL's importance for academic success. ANOVA results confirm no significant differences among university categories ( $p > 0.05$ ), suggesting that IL perceptions and engagement are consistent across institutions. This highlights the need for a universal IL strategy rather than institution specific approaches (Table 4.35 & Table 4.36).

Analyzing IL awareness across user categories like faculties, researchers, and students shows variations in knowledge, participation, perceived importance, and self-rated skills. Teachers demonstrate the highest awareness, participation, and IL skills, while Honor's students score lower in these areas. Master's and research students fall in between, with PhD and MPhil researchers showing slightly higher engagement than undergraduates. ANOVA results confirm significant differences ( $p = .000$ ) across all groups, highlighting the need for tailored IL programs to address disparities and enhance user engagement at different academic levels. Students feel they lack adequate IL skills and receive insufficient help from faculty, while professors

consider such skills important (Yevelson-Shorsher and Bronstein, 2018). Few faculties in the study reported developing their students' IL skills (Probert, 2009).

The analysis of satisfaction levels across university categories indicates that private and public university users report relatively higher satisfaction with IL initiatives, while international university users consistently show lower satisfaction. Although no significant differences were found for workshops, research training, and consultancy programs, library orientation ( $p = 0.007$ ) and online literacy programs ( $p = 0.011$ ) exhibited notable variations. These findings highlight the need for targeted improvements in orientation and digital literacy support, particularly for international students (Table 4.42 & Table 4.44).

Regarding user categories, teachers report the highest satisfaction across all IL initiatives, followed by PhD and MPhil researchers. At the same time Master's and Honor's students express lower satisfaction, especially in workshops, online literacy, and consultancy programs. ANOVA results confirm significant differences across all IL initiatives ( $p < 0.05$ ), with the highest variations in workshops ( $F = 24.745$ ) and research training ( $F = 19.149$ ). These results suggest that students, particularly undergraduates, require better targeted support to enhance their engagement and satisfaction with IL services (Table 4.45 & Table 4.46).

RQ5. What impacts, challenges and obstacles do university libraries in Bangladesh face in implementing IL programs aimed to achieve the SDGs?

### ***5.3.5 Impact of IL on academic and SDGs***

The impact of library IL programs on academic work is generally positive, with 56.9% of users benefiting (Table 4.46). However, 32.6% remain neutral, and 10.5% find little or no benefit, suggesting a need for improvements in practical applications and targeted support. Beyond academia, 59.2% recognize IL skills as useful in careers and personal decision making, though 31.2% are uncertain about their broader applicability (Table 4.47). Additionally, 73.1% acknowledge IL's role in societal development, particularly in alignment with SDGs, though 26.2% remain unaware of its impact (Table 4.48). These findings underscore the necessity for enhanced awareness, real-world applications, and strategic improvements in IL programs. Academic libraries' assessment of information, media, and data literacy positively impacts student learning but needs to integrate emerging technologies and challenges

(Pinto, 2024). Greater collaboration and communication between faculties, librarians, and students are needed to improve students' IL skills in academia (Yevelson-Shorsher and Bronstein, 2018).

Library users face significant challenges in developing IL skills, with inadequate support from staff (Mean = 3.78) and lack of awareness (Mean = 3.76) being the most prominent obstacles. Time constraints (Mean = 3.55) and difficulty accessing resources (Mean = 3.40) also hinder IL development, while fewer users find IL programs misaligned with their needs (Mean = 3.26) (Table 4.52). To enhance IL program accessibility and effectiveness, users strongly recommend customization to diverse needs (Mean = 4.28), consultation services (Mean = 4.26), and online/on-demand programs (Mean = 4.24). Integrating IL into curricula (Mean = 4.00) and increasing awareness (Mean = 4.02) are also widely supported (Table 4.55). These findings emphasize the need for targeted improvements in IL programs. Mahwasane and Mudzielwana (2016) found that when accessing information in the library, students face challenges, such as a lack of proper knowledge on information retrieval skills, insufficient user education, and a lack of computer knowledge. Most participants in the study of Abro *et al.* (2023) faced problems like inadequate IT infrastructure, low internet speed, lack of access to internet facilities, lack of awareness of e-resources, and lack of proper training on library literary information practices.

Nearly half (46%) of respondents found that library staff supported developing IL skills, with 20.3% rating them as very supportive. However, 22.3% remained neutral, and 11.4% were dissatisfied, indicating a need for improved engagement (Table 4.56). Preferred additional services include collaboration spaces for IL practice (Mean = 4.25), online IL tutorials (Mean = 4.22), and advanced IL workshops (Mean = 4.17), highlighting the demand for interactive and flexible learning opportunities. Regular IL updates (Mean = 4.07) and a dedicated IL support desk (Mean = 3.95) were also suggested but received comparatively lower preference (Table 4.57). These findings emphasize the need for enhanced library support and diverse learning resources.

The study identifies key resource gaps hindering IL programs aligned with SDGs. The most critical issue is the lack of institutional support and collaboration (Mean=3.90), followed by inadequate technological infrastructure (Mean=3.82) (Table 4.58). Other challenges include limited trained personnel (Mean=3.76) and financial constraints

(Mean=3.75), emphasizing the need for investment in staff training and budget allocation. Additionally, insufficient educational materials tailored to SDGs (Mean=3.71) and low user engagement (Mean=3.75) highlight the necessity for targeted resources and strategies to enhance participation in IL initiatives. Kez *et al.* (2024) found economic and administrative barriers are the primary impediments to academia's shift towards sustainability, highlighting the need for targeted strategies to align with the UN SDGs. Integrating SDGs in sub-Saharan Africa faces significant barriers, with institutional challenges, economic and socio cultural factors, and data access being the key elements (Haou *et al.*, 2025).

The study reveals mixed perceptions about the effectiveness of IL strategies in university libraries for supporting SDGs. While 13.7% of respondents find these strategies very effective and 17.7% somewhat effective, a large portion (28.2%) remains neutral, indicating uncertainty or lack of awareness. Notably, 40.4% perceive IL strategies as lacking, with 26.7% rating them somewhat lacking and 13.7% remarkably lacking (Table 4.59). These findings highlight the need for stronger and more visible IL initiatives to enhance their perceived impact on SDGs.

Academic libraries significantly contribute to SDGs by providing access to relevant information and training on IL (Hamad and Al-Fadel, 2021). University libraries in Ghana contribute to SDGs goal 4 by providing information and library services, promoting sustainable information practices, and supporting lifelong learning and quality education (Owusu-Ansah, 2021).

RQ6. What recommendations and the best practices can be proposed for university libraries to enhance their role in promoting IL for sustainable development?

### ***5.3.6 Recommendations and best practices***

The study highlights key suggestions for improving IL programs in university libraries, with strong support for enhanced promotion, collaboration, and resource expansion. The highest rated recommendation is effective promotion, emphasizing the need for better outreach strategies. Strengthening collaboration with faculties is also crucial for aligning IL programs with academic needs. Expanding IL resources and tailoring programs to specific disciplines can enhance engagement. Flexible scheduling and regular feedback mechanisms are also important to ensure accessibility and continuous improvement (Table 4.60).

The study highlights key strategies for enhancing library contributions to personal and academic development through IL initiatives. The highest rated suggestion is creating a repository of IL success stories and best practices to inspire students. Specialized IL resources for career development are also in high demand, supporting students' transition into the professional world. Integrating IL into academic mentorship and promoting peer-to-peer learning can further enhance engagement. Additionally, IL workshops and events and personalized IL coaching are seen as valuable strategies for interactive and customized learning (Table 4.61).

### **5.3.7 Correlation between research hypothesis and findings**

The research objectives (RO), research questions (RQ), and research hypotheses (RH) are strongly interlinked, forming a structured foundation for understanding the role of university libraries in promoting IL to achieve SDGs. The ROs define the broader purpose of the study, while the RQs break down these objectives into specific inquiries. The RHs provide testable assumptions, allowing empirical validation through data analysis. The findings from the study either support or refute these hypotheses, leading to actionable recommendations.

The study found that IL initiatives significantly contribute to SDG achievement (H1, H2), aligning with the objective of assessing the relationship between IL and SDGs (RO2). However, challenges such as inadequate institutional policies, limited resources, and technological barriers hinder effective IL promotion (H3, H5), which corresponds to the objective of identifying obstacles in IL implementation (RO5). Additionally, awareness and satisfaction levels regarding IL programs vary significantly among different user groups (H4), supporting the objective of analyzing user perception (RO4). The ANOVA results show no significant differences in user awareness, participation, perceived importance, or self-rated IL skills across university categories ( $p > 0.05$ ). However, significant differences exist among user categories for these variables ( $p = .000$ ). Satisfaction levels with IL initiatives vary across university categories, while user category satisfaction also shows significant differences ( $p < 0.05$  for all tests). Findings also highlight that integrating IL into academic curricula and fostering collaborations enhance IL's role in SDG advancement (H6), aligning with the objective of recommending best practices (RO6). Table 5.1 presents the structured correlation among these components:

**Table 5.1: Summarization of the research findings**

| Hypothesis                                                                                                                                                                                    | Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| There is impact of uniform IL initiative in university libraries of Bangladesh for achieving SDGs (H1)                                                                                        | The ANOVA results on IL initiatives in university libraries of Bangladesh show a statistically significant variation among the items ( $F = 83.424$ , $p < .001$ ), indicating differing responses across the assessed aspects of IL initiatives. The findings support hypothesis H1, indicating a clear impact of uniform IL initiatives across university libraries in Bangladesh.                                                                                                                                                                                    |
| There is a relationship between promotion of IL and the progress SDGs. (H2)                                                                                                                   | The F-value is 27.085, and the p-value (Sig.) is .000, indicating a highly significant result at the 0.01 level.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| There are key factors of IL such as user engagement and skill development, digital literacy training, environmental well-being, and financial support that contribute to achieving SDGs. (H3) | The study found through CFA that user engagement & skill development (percentage of variance 32.528), digital literacy training (percentage of variance 16.953), environmental well-being (percentage of variance 7.335) and institutional & financial support (percentage of variance 3.825) are four essential factors of IL for achieving SDGs.                                                                                                                                                                                                                      |
| There is a relationship between the level of awareness and satisfaction regarding IL initiatives among different university and user categories. (H4)                                         | ANOVA results show no significant differences in IL awareness across university categories ( $p > 0.05$ ) but significant differences among user categories ( $p = .000$ ). Satisfaction levels vary across both university and user categories ( $p < .000$ ).                                                                                                                                                                                                                                                                                                         |
| There is a positive impact of IL programs on achieving SDGs. (H5)                                                                                                                             | The ANOVA results on the impact of IL in achieving SDGs reveal a statistically significant difference among the item means ( $F = 26.396$ , $p = .000$ ), indicating that respondents perceived varying levels of impact across different aspects of IL. The grand mean of 3.82 suggests an overall positive impact of IL in achieving SDGs.                                                                                                                                                                                                                            |
| There are limitations such as inadequate funding, lack of awareness, and insufficient infrastructural support that hinder IL activities from attaining SDGs. (H6)                             | The ANOVA results on challenges in developing IL skills for achieving SDGs reveal statistically significant differences in respondents' perceptions across the listed issues ( $F = 23.528$ , $p = .000$ ). With a grand mean of 3.55, the data indicate that inadequate funding, lack of awareness and infrastructural supports are critical obstacles; IL integration into curricula, faculty partnerships, and digital library expansion are key solutions. Additionally, cross-institutional collaborations and policy advocacy can further strengthen IL programs. |

This correlation framework demonstrates how the study's objectives, questions, and hypotheses align with the empirical findings, ensuring a structured approach to enhancing IL programs in university libraries for SDG achievement.

## **5.4 Thematic analysis of questionnaire (Open-ended questions)**

### *5.4.1 Contribution to academic and personal growth*

The thematic analysis of library administrators' responses highlights key contributions of IL programs for academic and personal growth. The study revealed 8 themes: Enhancement of research and scholarly skills enables students and faculty to improve critical thinking, ethical information use, and digital literacy. Digital literacy and technological adaptability help users navigate e-resources and reference management tools. Personal growth and lifelong learning foster problem-solving and professional preparedness. The role of IL in teaching and faculty development supports faculty in refining research and teaching methodologies. Library services and awareness improve resource utilization. Integration of IL into university programs ensure academic curricula would include IL training. IL and SDGs emphasize IL's role in promoting quality education and reducing inequalities. Suggestions for improvement include better training, resource management, and career-oriented IL initiatives.

### *5.4.2 Challenges in designing IL programs and their effects*

The thematic analysis highlights key challenges in designing and delivering IL programs, affecting their effectiveness and sustainability. The study revealed 8 thematic challenges: Resource and budget constraints limit faculty training, infrastructure, and program expansion. Low student and faculty engagement stems from a lack of awareness and perceived relevance. Institutional and policy limitations hinder collaboration between librarians and faculties. Time constraints make it difficult to integrate IL into academic schedules. Technological barriers and the digital divide affect digital resource accessibility. Diverse learner needs and information overload make it challenging to design a standardized curriculum. Lack of awareness and motivation reduces participation. Sustainability and adaptability issues hinder program updates. Addressing these challenges it requires increased institutional support, resource allocation, curriculum integration, and tailored learning strategies.

### *5.4.3 Recommendation for enhancing the role of library*

The thematic recommendations from the library professionals emphasize six key areas for enhancing the role of university libraries in achieving SDGs through IL.

Strengthening IL Programs and Curriculum Integration suggest making IL courses mandatory, aligning them with SDGs, and expanding outreach to underserved communities. Collaboration and Networking call for partnerships with global organizations, universities, and policymakers to enhance SDG focused IL initiatives. Promoting research, open access, and digital inclusion include expanding open access resources, developing SDG focused repositories, and fostering media literacy. Capacity Building and Infrastructure Development highlight the need for dedicated IL budgets, staff training, improved infrastructure, and skilled personnel. User Awareness, Community Engagement, and Outreach stress the importance of IL awareness campaigns, SDG related workshops, and lifelong learning initiatives. Institutional Support and Policy Advocacy focus on integrating IL into university policies, securing funding, and implementing evaluation metrics to measure SDG contributions. Implementing these strategies strengthen the role of university libraries in fostering sustainable knowledge and achieving SDGs.

The recommendations from the users were thematically analyzed, revealing seven key areas for enhancing university libraries in alignment with IL and SDGs. Digital transformation emerged as a major theme, with users advocating for expanded e-resources, improved internet access, and digital library systems to promote lifelong learning. Inclusivity and accessibility were highlighted, emphasizing the need for services catering to marginalized groups, multilingual resources, and personalized IL support. Users also stressed SDG awareness and sustainability, recommending sustainability focused events, SDG resource hubs, and eco-friendly library management. Education and skill development were other critical themes, and call for digital literacy programs, career training, and curriculum integrated IL initiatives. User engagement and community outreach were identified as crucial, suggesting stronger faculty collaboration, interactive sessions, and libraries as community knowledge sharing hubs. Infrastructure and library environment improvements were also recommended, including expanded study spaces, discussion rooms, and better facilities. Finally, library policy enhancements and staff training were emphasized, with users advocating for SDG-aligned strategies, librarian up-skilling, and better staff incentives. These themes collectively highlight strategies to strengthen university libraries' role in supporting SDGs and fostering sustainable knowledge access.

## **5.5 Key findings on IL impression and challenges**

The study identified several key findings concerning IL's status, impression, and challenges in university libraries. The outcomes are characterized as follows:

### ***5.5.1 IL initiatives in university libraries of Bangladesh***

- i. University libraries in Bangladesh have made noteworthy steps in initiating the IL series; however, their application residues are inconsistent among academic libraries. While some universities have implemented organized IL initiatives with well-defined prospectuses, others lack formal tactics, leading to differences in IL consciousness and skill expansion among library users. Many libraries organize workshops and training periods, which are often irregular and rely on exterior funding or short-term institutional urgencies.
- ii. IL integration within academic courses is still at its primary level. Though some universities have started integrating IL segments within orientation programs, only a minority offer devoted IL courses as part of their degree programs. This inadequate addition limits students' aptitude to thoroughly obtain IL capabilities, stimulating them to efficiently circumnavigate academic and practiced information settings.
- iii. The obtainability of digital possessions has developed meaningfully, with university libraries contributing to open access journals, institutional repositories, and digital records. However, topics related to approachability persevere, especially in public universities where budget restraints hamper the growth of electronic set-up. Unsatisfactory access to high-speed internet, limited digital literacy among students, and insufficient IT support more intensify these challenges, restraining the full operation of existing IL resources.
- iv. University strategies supportive of IL initiatives remain insufficient. Most institutions lack devoted policies that dictate IL instruction as an indispensable element of academic pursuit. The lack of designed frameworks and administrative support marks IL enterprises' sustainability, making them dependent on ad-hoc efforts rather than sustainable tactical arrangements. Without institutional assurance, IL programs fight to achieve acknowledgement as a critical element of academic achievement and lifelong education.
- v. Identifying these breaks necessitates a more organized method for IL application, confirming homogeneousness across universities, assimilating IL into academic

programs, refining digital approachability, and founding academic policies that arrange IL as an essential feature of higher education.

### ***5.5.2 Relationship between IL and SDGs***

- i. IL plays an acute role in progressing the SDGs by preparing individuals with the abilities needed to contact, assess, and apply information successfully. University libraries, as centers of knowledge distribution, donate ominously to numerous SDGs through IL activities and connected enterprises.
- ii. IL is directly connected to SDGs goal 4 (Quality Education) by nurturing important capabilities such as research proficiency, critical thinking, and digital literacy. These competencies enable library professionals and users to steer the massive digital scenery, distinguish trustworthy sources, and improve their educational and lifelong learning understandings. University libraries that offer organized IL courses allow library patrons to be more self-determining learners, eventually improving educational consequences and research efficiency. Nevertheless, the uneven delivery of IL training across information institutions bounds its full effect on higher education in Bangladesh.
- iii. Beyond education, academic libraries also donate to SDGs goal 5 (Gender Equality) and SDGs goal 10 (Reduced Inequalities) by ensuring comprehensive learning surroundings. Many libraries compromise resources and facilities personalized to relegate groups like females, individuals, and unfortunate students. Through gender-sensitive IL programs and digital approachability training, libraries help to bridge the knowledge breach and permit various user groups. However, more targeted energies are compulsory to confirm that all library users, unrelatedly of gender or socio-economic contextual, can fully take advantage of IL properties and exercise.
- iv. IL programs promote environmental literacy aligned with SDGs goal 13 (Climate Action) by raising consciousness about long-lasting issues. Some university libraries have merged climate-related IL initiatives, offering accessibility to research resources on climate change, sustainable development, and environmental policies. Furthermore, the influence of these programs remains underexplored, as comparatively few universities have committed to IL initiatives focused on sustainable learning. Intensifying IL efforts in the area can reinforce

users' engagement with environmental concerns, adopting a more knowledgeable and positive approach to climate challenges.

- v. Notwithstanding these contributions, cooperation with exterior patrons for SDG-related an IL initiative is still restricted. Partnership with governmental institutions, NGOs, and international agencies such as UNESCO and IFLA might meaningfully improve the reach and efficacy of IL activities. Presently, higher academic libraries are functioning IL programs with marginal external arrangement, limiting their probable to affect broader SDG-related strategies and educational improvements. Establishing a partnership with external investors would simplify the conservation of resources, proficiency, and best practices, thereby exploiting the role of IL in attaining SDGs.
- vi. To overall control on IL for SDG accomplishment, university libraries in Bangladesh must implement a more organized and planned approach, assimilating IL activities into academic rules, promoting inclusivity and increasing alliances with appropriate stakeholders.

### **5.5.3 Factors influencing the promotion of IL for SDGs**

The effective promotion of IL for attaining the SDGs upholds some key factors, including institutional support, faculty engagement, financial means, and the stress on digital learning. Focusing on these factors is essential for confirming the durable sustainability and effectiveness of IL initiatives in university libraries.

#### ***5.5.3.1 Institutional support and policy activism***

Institutional assistance plays a serious role in the growth and development of the IL agenda. Without clear strategies and institutional assistance, IL programs often lack stability and fail to integrate excellently into academic arrangements. Universities with devoted literacy guidelines and formal IL sequences reveal better results in terms of student engagement and research production. Still, in Bangladesh, many organizations do not have well-defined IL rules, resulting in unreliable program execution. Robust policy backing is required to confirm IL is entrenched within university prospectuses and associated with broader educational and national development goals.

### ***5.5.3.2 Faculty involvement in IL programs***

The active involvement of faculties significantly impact on the promotion of IL. The inclusion of them helps students understand the processes involved in information retrieval, evaluation, and utilization. Faculty members help to integrate the gap between knowledge and application, which positively impact on students' reasoning and research skills. The universities that encourage the combined efforts of librarians and faculty members in integrated learning programs tend to have more actively participating students. Still, insufficient knowledge and untrained faculty on integrated learning practices strengthen their systems.

### ***5.5.3.3 Funding constraints***

The lack of sufficient funding for IL initiatives and other digital resources is a challenge that most organizations face. Most university libraries in Bangladesh have budget issues, which prevent them from acquiring modern integrated learning systems, online databases, and other training resources. Insufficient funds also hamper the hiring and training of librarians and other staff, which makes it harder to run IL programs. Perhaps these financial issues could be eased by acquiring outside funding from governments, international grants, and local industry partnerships.

### ***5.5.3.4 Digital literacy and misinformation awareness***

The increasing availability of digital materials raises the need for adequate digital literacy and misinformation practices. Many students and scholars depend on the internet too much and do not evaluate sources, which leads to inaccurate information and low-quality scholarly work. Good IL and instruction design should focus on digital literacy and teach users how to find, verify, analyze, and evaluate information from the digital world. However, the IL programs offered by most academic libraries with some form of digital literacy focus still emphasize traditional research practices instead of contemporary issues like misinformation, or automated content moderation. Components of digital literacy in IL programs prepare students and scholars to navigate the digital world more effectively.

In order to achieve the most significant change from IL in relation to the SDGs, academic libraries in Bangladesh need to focus more on providing infrastructure,

involving faculty members, getting funding that is not limited in time, and improving the teaching of digital literacy. These changes guarantee that IL initiatives positively contribute to sustainable development and equip the target users with the relevant information and skills for effective performance in academic and professional contexts.

#### **5.5.4 User perception, awareness and satisfaction**

Tracking user perceptions, awareness, and satisfaction as concerns' IL activities serve a significant role in enhancing library services by customizing their delivery to user requirements. The results of the study, supported by an Evaluation of Variance (ANOVA), pointed out significant differences in awareness of IL participation, perceived importance, and satisfaction in IL activities among different user categories and different universities.

##### ***5.5.4.1 Variations in IL awareness, participation, and perceived importance***

The ANOVA analysis of variance results illustrate that there were significant differences in the means of the IL awareness, participation, perceived importance, and self-reported IL skills of different user categories ( $p = .000$ ). This means students, faculty, and even researchers do not have the same level of knowledge and participation towards IL activities. Faculty members and postgraduate students showed more positive attitudes towards the two mentioned variables. Conversely, undergraduate students and infrequent library users showed lower levels of IL participation. These differences underpin the necessity for specific IL training needs for some user groups.

##### ***5.5.4.2 Differences in satisfaction levels across universities***

Content analysis shows that satisfaction levels concerning IL initiatives differ remarkably across universities and user groups ( $p < 0.05$ ). Some users from better-served institutions with established integrated IL programs and good library facilities tend to report higher satisfaction, whereas others with poor IL services and library resources have lower satisfaction. Users from universities with good digital infrastructure, library support, and integration of IL into the teaching curriculum express greater confidence in the use of IL materials. These results highlight the need

for institutional funding of IL programs to improve user experience and to increase the benefits generated.

#### ***5.5.4.3 Demand for improved digital resources and IL training***

One dominant issue under the feedback theme relates to the accessibility of digital resources and the quality of IL training programs. Many users feel that the implemented IL initiatives are not strong enough for them to be able to effectively use academic databases, assess information sources, and perform basic digital manipulation. Inadequate open access resources, low internet speed, and poor librarian support further exacerbate user participation in IL programs. Solving these issues by providing wider access to the internet, implementing more interactive IL classes, and embedding IL in other modules would significantly improve user satisfaction. By addressing these gaps, university libraries can create more user-centric IL initiatives that promote active participation, improve satisfaction levels, and contribute more effectively to academic success and achieving SDGs.

### **5.6 Challenges in implementing IL for SDGs**

Although IL is increasingly being accepted as an important determinant of achieving the SDGs, university libraries in Bangladesh are still struggling to execute proper IL programs. These challenges significantly impair the development, reach, and effectiveness of IL initiatives and how they contribute to education and research sustainability.

#### ***5.6.1 Limited resources***

Inadequate financing is still one of the most serious hindrances to IL execution. Many university libraries cannot afford basic learning resources that comprise books, academic journals, and digital databases. Financial limitations also dictate the growth of library services and mid-educational outreach activities, as well as the employment of IL solicitations. Without funding, increasing effort toward IL program development and maintenance is not feasible.

### ***5.6.2 Inadequate infrastructure***

A number of university libraries do not have the requisite facilities for delivering comprehensive IL training. The complete absence of IL labs, limited seating, and lack of high-speed internet access severely hamper the learning environment. Overall, dilapidated library spaces further disengage students from learning, which undermines the objective of IL programmes.

### ***5.6.3 Lack of trained personnel***

A critical problem exists in the form of under-qualified librarians with no experience in IL instruction. For effective IL programs to be successful, there needs to be constant input from trained personnel capable of assisting faculty and students in skill development, information selection, and the use of online resources. Unfortunately, many university libraries lack personnel with such primary IL skills, hindering the achievement of literacy programmes designed to meet the SDG aims.

### ***5.6.4 Low user awareness***

Numerous students and even some faculty members are still uninformed of the possible benefits of IL programs. The lack of aggressive marketing campaigns alongside noncompulsory training workshops severely lowers attendance. Users do not appreciate raising awareness of IL because they do not see the importance of improving their educational and research skills. This gap reflects the need for improved outreach efforts that boost the use of IL by university populations.

### ***5.6.5 Technological barriers***

The absence of ample and uninterrupted access to computers, e-learning sites and other digital libraries IL imposes on itself significantly reduces its utility. Many university libraries continue to use obsolete systems, which make gaining access to online databases and available research materials very difficult. Furthermore, poor internet access severely limits the ability to access online learning materials. Solving these problems is crucial for improving the role of IL in education and achieving the intended purpose of sustainable development. Once these barriers are removed, university libraries capture their users and interest them more profoundly in academic research and self-study by using more advanced IL effectiveness supporting SDGs.

## **5.7 Opportunities for enhancing IL in university libraries**

Even with obstacles, there are numerous opportunities that could be utilized to advance IL initiatives and improve the role of university libraries in relation to SDGs.

### *5.7.1 Strengthening institutional support and policies*

Though there are many challenges, there are also adequate opportunities to improve IL initiatives in university libraries through the enhancement of institutional support and policy frameworks. Providing a supporting policy structure complemented with financial and managerial input guarantees the viability and sustainability of IL programs against the established goals, which are targeted under the SDGs.

#### *5.7.1.1 Integration of IL into academic curricula and research programs*

Universities can integrate IL components into the academic credit courses and their research work for value addition. The integration of IL in the undergraduate and postgraduate programs would facilitate the students in acquiring essential skills for research and general information technology. Besides, incorporating IL into Faculty development programs may foster the willingness of academic staff members to integrate IL into their pedagogy and research.

#### *5.7.1.2 Prioritizing budget allocation for IL programs*

In order to expand IL initiatives, funding, especially financial sustainability, is crucial. Universities need to earmark some budget for the purchase of digital materials and organizing IL training workshops, as well as for the improvement of library infrastructure. Moreover, support from national and international institutions may further assist to improve IL infrastructure and services.

#### *5.7.1.3 Institutionalizing librarians' training programs*

With proper regular training, librarians are able to deliver IL services effectively. Initiatives directed towards the professional development of staff in the library should address modern techniques of IL instruction, digital literacy, and knowledge of new research products. Further enhancement of librarians' competencies can be achieved through certification programs and interaction with foreign IL training institutions.

This set of strategies aids the libraries of the universities working towards a more integrated approach to IL, which helps foster learning and research sustainably while assisting with the national and international SDG objectives.

### **5.7.2 Expanding digital access and e-resources**

Further advancement of accessibility to programs and overall digital resources is necessary for the enhancement of IL programs in university libraries. Libraries can utilize digital resources and international collaborations to enhance accessibility and support students with research aligned with SDGs.

#### *5.7.2.1 Collaboration for access to digital repositories and open-access journals*

University libraries can collaborate with international bodies, research organizations, and digital library consortia to gain access to highly vetted academic resources. Such collaborations with the Directory of Open Access Journals (DOAJ), HINARI, and Research4Life can greatly assist both students and faculty by minimizing reliance on expensive subscriptions.

#### *5.7.2.2 Implementation of digital library platforms for remote learning*

The construction and enhancement of digital library facilities facilitate remote access to IL training, e-books, and research databases. IL skills can be developed through modules, videotaped lectures, and animated IL courses that can be used at the learner's discretion. Digital libraries facilitate blended learning methods and therefore widen the scope of access to IL education.

#### *5.7.2.3 Enhancing internet connectivity for research and digital literacy*

For effective IL teaching, online resource research, and digital asset retrieval, reliable and robust Internet connectivity is necessary. Universities should focus on upgrading their internet connectivity within the libraries so that students and researchers are able to effortlessly access online databases, research instruments, and e-learning modules. Additionally, study and discussion areas equipped with WiFi can promote active participation in learning and digital activities.

University libraries can significantly improve IL programs, foster inclusive knowledge access, and contribute towards the fulfilling SDGs goal 4 (Quality Education) and SDG 9 (Industry, Innovation, and Infrastructure) by increasing the availability of digital access and e-resources.

### **5.7.3 Collaboration and networking**

Collaboration and networking are vital for advanced IL activities and the integration of university library services with the SDGs agenda. Collaboration with professional bodies, faculty members, and local colleges can improve library resource sharing, research literacy, and community participation.

#### *5.7.3.1 Partnership with international and local organizations*

Global and national organizations relevant to educational institutions like, the International Federation of Library Associations and Institutions (IFLA) and the American Library Association (ALA) as well as local NGOs can significantly aid university libraries. These relationships can help secure grants, design professional training programs, and even relocate collection resources. Other joint strategies, like advocacy campaigns for IL and focused literacy programs towards the SDGs, can enhance the visibility and impact of university libraries.

#### *5.7.3.2 Faculty-librarian collaboration for research literacy*

The collaboration of faculty members with the librarian is crucial in augmenting research literacy because IL teaching is incorporated into academic courses. Faculty members can be assisted in developing IL infused courses by librarians who are also conduct research pedagogical workshops with students in higher level academic writing and citation skills. These collaborative efforts maximize student participation and enhance their abilities to use scholarly information.

#### *5.7.3.3 Establishing regional IL networks for knowledge sharing*

University systems can set up regional IL networks to facilitate information sharing on teaching practices and instructional literacy methodologies. These networks could hold IL and SDG conferences and workshops and direct cooperative research pursuits. They can also assist as platforms for the distribution digital resources, developing standardized IL frameworks, and encouraging for policy variations at institutional and national levels.

Through collaboration and networking, university libraries can deepen their IL engagement, improve user participation, and provide better support to sustainable development efforts.

#### **5.7.4 Promoting community engagement and outreach**

Fostering the community's understanding of IL is crucial for university libraries to enhance their impact and promote development. Libraries can design specific outreach activities that motivate students to participate, create awareness of IL's contribution towards achieving SDGs, and encourage the protection of the environment.

##### *5.7.4.1 IL awareness campaigns for student participation and lifelong learning*

University libraries can put together campaigns aimed at raising IL awareness to inform students of its relevance in their academic work and other learning endeavors. These campaigns can be organized as workshops, focused group discussions, and publicity materials on digital literacy, research, and critical thinking. Students can also be motivated to use library resources more effectively through competitions, storytelling, and other practical sessions.

##### *5.7.4.2 Sustainability focused events and SDG-related workshops*

Libraries can donate to SDG support by presenting sustainability focused proceedings, such as panel discussions, demonstrations, and guest lectures on environmental fortification, social justice, and financial sustainability. Conducting SDG-related workshops can help students and faculty understand the role of IL in identifying global challenges, such as climate change (SDG 13), gender equality (SDG 5), and reduced inequalities (SDG 10). These measures can adopt interdisciplinary teamwork and stimulate contributors to assimilate sustainability into their academic and professional endeavours.

##### *5.7.4.3 Green library initiatives for environmental sustainability*

University libraries can actively assist environmental sustainability by executing green library initiatives, such as paperless services, energy-efficient substructures, and eco-friendly performs. Promoting digital resources over printed resources, integrating reprocessing programs, and using sustainable building designs can expressively decrease the environmental footmark of libraries. Moreover, engaging users in environmental literacy programs can nurture a culture of sustainability within academic societies.

By endorsing community assignation and outreach, academic libraries can reinforce IL awareness, assist SDG related learning, and enhance their role as dynamic centers for knowledge distribution and durable improvement.

### **5.7.5 Leveraging technology for IL development**

Progressions in technology suggest noteworthy prospects for increasing IL plans in university libraries. By incorporating digital apparatuses, mobile-based solutions, and data analytics, libraries can progress accessibility, engagement, and the inclusive impression of IL performance.

#### *5.7.5.1 AI-driven IL tools and interactive learning platforms*

Artificial Intelligence (AI) can reform IL exercise by donating personalized learning involvement. AI-driven tools, such as chatbots, recommendation systems, and adaptive learning platforms, can monitor professionals and users in improving research ability, examining information trustworthiness, and refining digital literacy. Interactive e-learning platforms with IL modules, quizzes, and virtual reproductions can make IL training more attractive and effective for professionals, faculty members and learners.

#### *5.7.5.2 Mobile-based IL programs for accessibility*

Mobile technology can connect the accessibility gaps by conveying IL resources to underserved societies. Mobile-based IL programs can contain dedicated apps, SMS-based learning modules, and mobile responsive digital libraries that deliver tutorials, research guides, and literacy debts. This attitude guarantees that students and faculty members can contact IL training anytime and anywhere, improving inclusivity and outreach.

#### *5.7.5.3 Data analytics for measuring IL impact and service improvement*

Incorporating data analytics into IL programs permits libraries to monitor user engagement, assess learning outcomes, and optimize service delivery. By analyzing user interactions, feedback, and participation patterns, libraries can refine their IL strategies, tailor training sessions, and identify zones for improvement. Predictive analytics can also aid libraries to expect user needs and improve proactive IL involvement.

By adopting AI driven tools, mobile technology, and data analytics, university libraries can enrich IL development, confirming IL programs are more adaptive, accessible, and effective in attaining SDGs.

### **5.8 Contribution of the Study**

This study marks several key contributions to the field of IL and its role in supporting the SDGs within the context of university libraries in Bangladesh. *Firstly*, it offers experimental evidence on how IL programs contribute to awareness, skill development, and informed decision-making among students and faculty, directly prompting progress toward specific SDGs. *Secondly*, the research ascertains some critical challenges such as lack of funding, insufficient infrastructure, and low awareness that hinder IL implementation, proposing a foundation for strategic improvement. *Thirdly*, the study highlights the influence of uniform IL initiatives and suggests practical policy recommendations for integrating IL more effectively across institutions. *Lastly*, by combining both quantitative and qualitative analyses, it presents a comprehensive picture that can guide future academic programs, library services, and national education strategies related to digital literacy, sustainable learning, and lifelong education.

### **5.9 Chapter summary**

The findings of this study underscore the significant role of university libraries in fostering IL as a means to achieve SDGs. While libraries have initiated various IL programs, inconsistencies in implementation, lack of institutional policies, and resource constraints remain major challenges. The study confirms that integrating IL into academic curricula, enhancing digital resources, and fostering collaborative partnerships can substantially improve IL's impact on SDG-related knowledge dissemination. Moreover, strengthening infrastructure, ensuring inclusivity, and securing institutional support are crucial for sustainable progress. By addressing these challenges and implementing the recommended strategies, university libraries in Bangladesh can serve as key facilitators of knowledge empowerment, ultimately contributing to national and global SDGs. This chapter has sketched the key findings of the study, emphasizing the current state, impact, and challenges of IL initiatives in university libraries in Bangladesh. Despite financial, infrastructural, and policy-

related obstacles, there are substantial prospects to improve IL's role in achieving SDGs. Strengthening institutional policies, showing strategic partnerships, mounting digital access, and controlling technology can make meaningful advancements. Pointing out these challenges and exploiting the identified opportunities will qualify university libraries to convert into knowledge hubs that enthusiastically contribute to sustainable development in Bangladesh.

**CHAPTER SIX**  
**CONCLUSION**

## **CHAPTER SIX: CONCLUSION**

### **6.1 Introduction**

This chapter describes the broader consequences of the study, offering endorsements for establishing Information Literacy (IL) initiatives in higher academic libraries and their involvement in attaining the United Nations Sustainable Development Goals (UN SDGs). The chapter also presents the future directions of the study for research and delivers an ultimate reflection on the study's importance.

### **6.2 Implications of the study**

The study identified the transformative possibility of IL in university libraries, highlighting its role in improving educational consequences, research aptitudes, and justifiable development efforts. The results emphasize several significant implications as follows:

#### **6.2.1 Academic and research implications**

The study exposes that IL activity is crucial in improving academic and research abilities among university library users such as, faculty members, researchers, and students. Enlightening IL programs can considerably impress higher education by refining research productivity, digital literacy, and academic achievement.

##### *6.2.1.1 Improving critical thinking, research skills, and digital literacy*

IL initiatives provide library users with the necessary tools and techniques to assess and manufacture information analytically, adopting investigative thinking and problem-solving abilities. In an era of electronic growth, where massive quantities of information are voluntarily available, the capacity to measure integrity, distinguish misinformation, and use intellectual resources meritoriously is necessary. Increasing IL training supports SDG 4 (Quality Education) by preparing users with skills that endorse independent learning, self-directed investigation, and evidence-based decision-making.

Additionally, research abilities are a basic need for academic attainment. Students who undertake arranged IL exercises prove healthier performance in literature searches, reference management, and research approaches. The relevant academic resources develop their competency to demonstrate high-quality projects, theses, and research articles. Faculty members also benefit from IL training as it empowers them to incorporate IL ideas into their teaching methods, confirming that students become adept in academic research activity.

*6.2.1.2 Enhancing academic performance through active information retrieval*

One of the significant obstacles to academic brilliance is the incompetence to detect and utilize proper resources. Many students fight with recognizing reliable academic sources, which destructively affects the value of their coursework and investigation. The study exposes that university libraries with robust IL initiatives bring higher levels of research output, better reference practices, and improved student performance.

By teaching students how to use academic resources, electronic databases, and referencing techniques, IL programs accelerate their ability to recover precise, up-to-date, peer-reviewed, and authentic information. The process helps in individual learning as well as contributes to university rankings, promoting a philosophy of research superiority. Universities that capitalize on library-based IL initiatives confirm that students and faculty members can capability to professionally access, assess, and apply scholarly publications.

*6.2.1.3 Integrating IL into university curricula for sustainable development*

Majority of the universities in Bangladesh lack a formal attitude to IL training, although there is a growing gratitude for IL's position. IL exercise is frequently presented casually through library orientation programs, which confines its long-lasting impact. The study proposes that implementing IL progressions into university courses can lead to an organized, durable, and established attitude to IL instruction.

By assembling IL as a compulsory element of the academic agenda, universities can confirm that users acquire lifetime education abilities that

encompass beyond their academic sessions. A pre-designed programme can contain a basic IL curriculum for Honor's students, an advanced research course for Master's students, and particular IL components tailored to various departments, guaranteeing consequences to specific academic grounds.

A planned IL program confirms that students excel in their academic pursuits and grow movable abilities that are appropriate in their professional careers. Besides, supporting IL activities with university regulations guarantees sustainability, boosting uninterrupted investment in IL improvement.

### **6.2.2 Implications on institutions and policies**

This emphasizes the importance of the institutions and the policy framework, as well as strategic planning toward strengthening IL initiatives in the university libraries. Appropriate policies, frameworks, and administrative backing can guarantee that IL programs are implemented in a sustainable, effective, and widespread manner.

#### *6.2.2.1 Mandating IL training as a core component of higher education*

The IL module is perhaps one of the most critical problems confronting Bangladeshi universities. In several institutions, IL training is either voluntary or offered as a part of introductory library training, which does little to promote the acquisition of appropriate skills for independent learning and research. In response to this challenge, universities must define policies that make IL training compulsory within the formal curriculum of students' training. This research suggests IL training may be included in the curricula of the universities for the following reasons:

- i. IL training should be included, without exception, in the programs of study for both undergraduate and postgraduate students to ensure the acquisition of relevant research and information technology skills.
- ii. An IL qualifying competency must be included within the description of credentials competent enough to accredit a university, so that all educational establishments are offered structured procedures for teaching IL.
- iii. IL training should also be mandatory for teaching staff to facilitate the incorporation of information literacy into their teaching and research practices.

Letting more and more IL as an integral part of academia ensures that students and faculty members have the right tools to run in the constantly changing information environment, continuing and delivering better learning and research.

#### *6.2.2.2 Prioritizing IL in budgetary and strategic planning*

Despite the widespread recognition of the importance of IL, many university libraries allocate insufficient funding and receive minimal administrative support for its implementation. Such under-investment restricts their capacity to develop IL programs, acquire digital content, and up-skill library staff. Governments and university administrators must make IL as a fundamental skill often backed by budgetary support as follows:

- i. Designing/updating IL curricula for emergent practices such as AI-driven literacy tools and misinformation awareness.
- ii. To hire and train library staff who can provide high-quality IL instruction and research support.
- iii. Investing in digital infrastructure such as e-learning platforms, online databases and virtual IL training modules.

Through collaboration, university leadership, library professionals, and faculty members can contribute to strategic planning to better align IL policies with the institutional mission and broader educational objectives at the national level. Integrating IL into long-term academic development plans place universities in a better position to create an environment where learning is research-oriented and knowledge-driven.

#### *6.2.2.3 Adopting data-driven decision-making for IL improvement*

To facilitate the impact of IL programs, universities should employ data analytics and performance metrics. Many information institutions lack structured valuation mechanisms to assess the effect of IL activity. Containing evidence-based decision-making can assist libraries in the following areas:

- i. Analyze student engagement and learning outcomes from IL trainings.

- ii. Evaluate the level of faculty involvement and the inclusion of IL in the teaching and research aspects.
- iii. Assist in identifying literacy lacks and chances for enhancement, ensuring the demand for IL activities is aligned with services delivered.

Information institutions can influence survey response, custom statistics, and AI-driven analytics to elevate their IL agenda, manufacturing them more actual, user-centered, and approachable to academic stresses. Moreover, data-driven visions can offer convincing indications for officials to validate continuous investment and policy modification for IL expansion.

### **6.2.3 Social and economic implications**

The paper comments on broader social and economic effects related to IL, outside of the academic world. Because it promotes equality in accessibility to information, bridges the digital gap, and increases the likelihood of employment, IL also plays another supporting role in the deceleration of inequalities (SDG 10) and economic growth (SDG 8)

#### *6.2.3.1 Reducing inequalities through IL (SDG 10)*

Social inclusion and participation greatly depend on the availability of trustworthy and reliable information. Marginalized communities, poor students, and the greater rural population remain typically within this divide due to their low resource base and insufficient digital infrastructure to access such information. Improved deficits of IL programs help play an effective role in the same disparities through:

- i. Training on information-seeking skills is needed to place the capacities of access, evaluation, and use of information between student and researcher profiles on an equal footing.
- ii. Offering digital literacy programs with limitations on the ability first to find their way around internet resources and further adhere privilege to an underprivileged community.
- iii. Provide accessibility through inclusive initiatives on IL, special programs for differently-abled students and multilingual IL resources that facilitate the multitude of ethnic minorities.

With the inclusion of IL in higher education, the institutions tend to promote equal academic opportunities where all students, rich or poor, earn their part of the essential skills in researches and critical thinking.

#### *6.2.3.2 Bridging the digital divide for equal opportunities*

The major responsible factors responsible for the variation in the accessing of digital resources among different categories university and users are found in this study, where the digital divide created by differences in technological infrastructure, access to the internet, and the levels of digital literacy that hold back most students and faculties from maximum use of IL services. Therefore, in a bid to bridge this gap, universities and libraries should:

- i. Invest in online library platforms, open-access resources, and e-learning tools to broaden digital access;
- ii. Pilot mobile-based IL programs to expand the reach of digital literacy training among students, especially for those in remote areas;
- iii. Run targeted IL workshops for the low-end disconnected students to enable them to acquire the necessary skills to participate and compete in a digital knowledge-based economy.

Universities are able to help to flatten the digital playing field so that all students, regardless of their socio-economic background, are able to successfully interact with digital resources and academic content by addressing inequities in digital access and literacy.

#### *6.2.3.3 Enhancing employability and workforce readiness (SDG 8)*

IL is a key component of workforce preparedness and career advancement. The growing demand for critical-thinking skills, originality in research, and the ability to adapt to new digital technologies after graduation is where employers are looking more at graduates' soft skills than ever. Universities can help economic growth and employability through:

- i. Embedding IL in career development programs for job-relevant research and development of information management skills;

- ii. Providing subject-specific IL workshops and assisting students to access professional databases, resources on market research, and analytics tools;
- iii. Work with employers and industry stakeholders to shape IL programs to fill industry gaps so that graduates are ready for the knowledge economy.

Integrating IL for professional development programs improves the career prospects of students as well as promotes lifelong learning in a skilled workforce.

#### **6.2.4 Technological implications**

This research highlights the increasing role that technology plays in IL projects, particularly in the areas of library infrastructure modernization, cyber-security education, and resource access expansion. Incorporating emerging technologies can help university libraries to improve IL programs and user participation and foster continuous learning.

##### *6.2.4.1 Modernizing library infrastructure with digital platforms*

University libraries have to adopt new technologies to conduct IL training efficiently. This study shows that most libraries do not have AI-based digital platforms, which makes IL instruction inaccessible and ineffective. For this reason, universities need to:

- i. Integrate AI-powered IL apparatuses that afford modified learning practices and mechanized research support;
- ii. Improve mobile-based IL curricula to enable learning available for users anytime, anywhere;
- iii. Familiarize with virtual and augmented reality tools for collaborating learning familiarities, especially, in research-based IL teaching.

By adopting digital conversion, information institutions can offer innovative and appealing IL facilities that meet the growing demands of faculty members and students.

*6.2.4.2 Strengthening cyber-security and information ethics training*

The snowballing dependence on online platforms increases concerns about cyber-security pressures, fabrication, and moral use of information. The study assessed the need for better exercise on information ethics, digital safety, and a serious assessment of online sources. Encouraging accountable digital residency, universities should:

- i. Assimilate cyber-security consciousness agendas into IL exercises to instruct users about online confidentiality and privacy, data security, and cyber threats;
- ii. Suggest courses on information and digital ethics, highlighting accountable information use, academic honesty, and piracy anticipation.

*6.2.4.3 Expanding access to open educational resources and repositories*

Restricted entrance to academic records and high-quality informative properties remains a noteworthy obstacle to IL growth in most universities. Open-access digital resources can bridge this gap and stimulate lifelong learning. University libraries should improve institutional repositories, ensuring open access to intellectual outputs, collaborating with international organizations, such as UNESCO's OER program, and campaigning for open-access strategies.

### **6.3 Recommendations for strengthening IL initiatives**

Based on the research output, the researcher proposes several key recommendations to accelerate the speed of IL programs in higher academic libraries of developing countries like, Bangladesh.

#### **6.3.1 Establishment of institutional support and policy frameworks**

Administrative assistance and pre-defined strategy outlines are vital for the long-term sustainability and usefulness of IL ingenuities in university libraries. The study presents policy gaps, funding limitations, and the requirement for stronger faculty-librarian teamwork as critical areas for expansion. Consolidation of these aspects increases the role of IL in higher education and supports the achievement of SDGs.

*6.3.1.1 Validating IL policies and integrating IL into curricula*

Most universities lack official policies on IL, which leads to the varying implementation of IL programs. To guarantee IL becomes a fundamental academic proficiency, universities should develop institutional IL policies that direct IL exercise as part of graduation curricula and integrate IL courses into academic programs. By embedding IL within academic curricula, universities can prepare learners with essential research and digital literacy skills, promoting lifelong learning and academic achievement.

*6.3.1.2 Establishing dedicated IL funding for sustainability*

Financial constraints limit IL program expansion, affecting training session availability, digital resources, and technological tools. The study highlights the need for universities to allocate dedicated budgets for IL programs, ensure sustainability, pursue funding and grants from governmental and international agencies, invest in modern IL infrastructure in e-learning platforms, etc. A sustainable model enables university libraries to magnify IL initiatives and provide continuous training prospects.

*6.3.1.3 Encouraging faculty-librarian collaboration for effective IL integration*

Teamwork between faculty members and librarians is crucial for operative IL employment, yet many institutions lack organized appointment policies. To bridge this gap, universities should inspire faculty to integrate IL training into their courses, simplify joint faculty-librarian workshops, fostering interdisciplinary attitudes.

**6.3.2 Intensifying digital access and infrastructure**

Improving digital access is essential for the effective implementation of IL programs in university libraries. The study highlights technological hurdles, limited e-resource approachability, and insufficient digital literacy training as key experiments deterring IL advancement. Addressing these issues enables university libraries to simplify seamless access to information, support distant learning, and contribute to attaining SDGs.

*6.3.2.1 Investing in rapid internet and e-resource subscriptions*

Many university libraries in Bangladesh face challenges related to slow internet speed, limited digital learning platforms, and restricted access to e-resources. To bridge these gaps, universities should upgrade internet setup to ensure stable, rapid connectivity, enabling continuous entrance, and enlarge subscriptions to e-resources, including academic databases, open-access journals, and e-books.

*6.3.2.2 Developing mobile-responsive IL programs for remote learners*

With the growing use of mobile devices for education, university libraries should familiarize IL programs to be mobile-friendly to ensure wider accessibility. Universities can ensure it by developing mobile-responsive IL training modules that can be accessed through smartphones and applying social media and messaging platforms to exchange IL content. By adopting mobile technology, libraries can grasp broader spectators, aid remote learning, and uphold educational quality.

*6.3.2.3 Global digital repositories for diverse research materials*

Restricted access to scholarly publications remains a prime obstacle for university library users. To decrease this, universities should form partnerships with international repository communities, such as the Directory of Open Access Journals (DOAJ), HINARI, and JSTOR, and Join Library Consortia and collaborative networks to share digital resources and enhance cost-effective access to e-resources. Strengthening global partnerships broaden research opportunities, enhance academic collaborations, and improve access to high-quality knowledge resources.

**6.3.3 Improving user engagement and awareness**

Operational user engagement and responsiveness are important for the achievement of IL enterprises in university libraries. The study results identify that low awareness and participation levels among users delay the impression of IL curricula. To discourse these experiments, libraries must implement targeted awareness campaigns, modified learning attitudes, and peer-led creativity to raise vigorous involvement and knowledge-sharing.

*6.3.3.1 Guiding IL awareness campaigns and workshops*

A key barrier to IL acceptance is the lack of awareness about its importance in academic success and research activities. To increase participation, the university library can organize regular IL workshops and training sessions, launch campus-wide IL awareness campaigns, and integrate IL orientation sessions into newcomers and faculty onboarding programs to ensure early exposure to IL resources and services. Awareness campaigns empower students and faculty members to apply library resources successfully.

*6.3.3.2 Offering IL coaching and interactive learning modules*

General IL programs may not address the various learning requests of users. To advance engagement, the university library can provide one-on-one IL coaching sessions and improve communicating IL e-learning components, including video tutorials and self-paced courses to make learning engaging. Personalized learning approaches enhance user experience, encourage self-directed learning, and expand IL skill custody.

*6.3.3.3 Promising peer-led IL training for student engagement*

Peer-based learning adopts association and knowledge-sharing among students, making IL programs more appealing and relevant. To simplify this, the library authority can launch IL peer mentorship programs and generate IL ambassador creativity.

**6.3.4 Constructing professional capacity and development**

The efficiency of IL programs mostly relies on the professionals' capacity, knowledge, and capability. The study identifies that many university libraries in Bangladesh lack trained personnel to design and implement IL initiatives aligned with SDGs. To overcome this challenge, continuous professional development, international collaborations, and research incentives are essential for building library professionals' capacity and ensuring high-quality IL services.

*6.3.4.1 Continuous training on digital literacy, research support, and SDG-focused IL*

Librarians need up-to-date knowledge of emerging digital tools, research methodologies, and SDG-related IL initiatives to support students and faculty

effectively. Universities should arrange regular training programs on digital literacy, open-access resources, reference management training and provide specialized workshops on IL integration in SDG-related disciplines.

#### *6.3.4.2 Establishing international professional exchange programs*

Alliance with global institutions and professional organizations can meaningfully heighten the expertise of university library professionals. To facilitate this, authorities can develop library exchange programs with leading international universities and research institutions and inspire partaking in international arrangements like conferences, workshops, and training programs hosted by IFLA, ALA, ASIALA, etc.

#### *6.3.4.3 Incentivizing librarian-led research and publications*

Boosting research and intellectual contributions by library professionals raise nonstop learning and knowledge allotment. To achieve this, the University Grants Commission (UGC) can assure grants and funding prospects for librarian-led research projects on IL best performance, SDG integration, and digital resource supervision and inspire publication in national and international indexed journals and conference proceedings.

### **6.3.5 Establishment of collaborations and networking**

Collaboration and networking are essential for intensifying IL initiatives, ensuring sustainability, and aligning IL programs with SDGs. Partnerships with global organizations, local institutions, and private sector stakeholders can provide resources, proficiency, and grants to increase university library services in Bangladesh.

#### *6.3.5.1 Partnering with global organizations for IL outreach*

Collaboration with the international organizations such as International Federation of Library Associations and Institutions (IFLA), American Library Associations (ALA), and UNESCO can significantly strengthen IL programs. Universities should engage in global IL initiatives to adopt best practices and innovative teaching methods, influence training and funding opportunities, and participate in international conferences and workshops to exchange knowledge.

*6.3.5.2 Creating regional IL networks for knowledge sharing*

Founding national IL networks among universities can ease collective learning, resource sharing, and policy development. To achieve this, universities should form consortia among academic libraries and organize inter-university IL workshops and conferences.

*6.3.5.3 Engaging in public-private partnerships for funding and expertise*

Public-private partnerships can afford financial help, technological support, and training prospects for IL programs. Universities should collaborate with technology firms to develop digital IL tools and engage corporate sponsors and NGOs to secure funding for IL campaigns.

**6.3.6 Integrating technology for IL development**

Information and Communication Technology (ICT) ensures a transformative role in intensifying IL activities, enhancing accessibility, and developing user engagement. Incorporating AI-driven learning platforms, mobile applications, and data analytics can revolutionize IL teaching and ensure evidence-based decision-making in information institutions.

**6.4 Limitations of the study**

The study is limited to Bangladeshi universities, and 25 university libraries were chosen, specifically from the top 25 Bangladeshi universities ranked by QS ranking 2024. This may limit the generalizability of the findings to other universities' contexts. Access to relevant data on library operation, budget, and literacy programs may be restricted and may not publicly disclose. This could limit the depth of analysis. Due to resource and time constraints, the study may not include all universities in Bangladesh. The effectiveness of literacy programs may depend on librarians' training and expertisation, and the study not evaluates librarians' professional development. The study focuses on SDGs' goal related to education and innovation but does not extensively explore gender equality or environmental sustainability. This focus might narrow the potential application of the findings to other SDGs. A significant part of the study relies on the perceptions of librarians, faculty members, and students, which may introduce subjective biases. Although efforts are made to triangulate data, subjective perceptions can affect the objectivity of the findings.

## 6.5 Future research directions

This study identifies cherished insights into the role of IL in achieving SDGs, several areas persist exposed for future investigation. Further study can focus on long-term influences, technological improvements, cross-institutional assessments, and embattled SDG-specific IL agendas to strengthen thoughts.

- i. Assessment influence of IL initiatives on students' success:* Future Research may inspect the long-term impact of IL training on improving precarious thinking, research capability, and academic attainment. Justify the relationship between graduate employment and IL proficiency, especially in knowledge-based dealings. Assessing the students' engagement with IL training that can display greater tractability in response to the altering digital economy and the job market.
- ii. Role of emerging technologies in IL development:* Discovering how Artificial Intelligence (AI), machine learning, and chatbots can personalize IL training. Examining the potential of blockchain technology for protected and confirmable digital credentialing of IL skills. Inspecting virtual reality (VR) and augmented reality (AR) as immersive tools for IL education, enlarging user connectivity and collaborative learning expertise.
- iii. Comparison of IL implementation across institutions:* Conducting cross-institutional studies to assess differences in IL policies, experiments, and best practices among various public, private, and international universities. Associating IL strategies and outlines across different countries to detect global inclinations and region-specific fences. Measuring the influence of institutional rules and finance structures on the efficacy of IL activities.
- iv. Effectiveness of SDG-specific IL programs:* Evaluating the success of IL courses in endorsing consciousness and acting toward specific SDGs, such as environmental sustainability (SDG 13), gender equality (SDG 5), and reduced inequalities (SDG 10). Assessing how IL creativity affects library users' engagement in sustainable development projects. Exploring the role of IL in adopting civic accountability, ethical research practices, and social novelty associated with SDGs.

Future studies can assume multidisciplinary attitudes, empower emerging technologies, and conduct comparative studies to fortify the role of IL in education, workforce development, and sustainable growth. By identifying these research paths,

library professionals and research enthusiasts can refine IL approaches to better assist SDGs and the developing requirements of the digital era.

## **6.6 Concluding remarks**

This study underlines the acute role of IL in higher academic institutions and its orientation toward SDGs. University libraries assist the users as knowledge hubs that empower students, faculty members, and researchers with essential IL activities. However, challenges such as funding limitations, inadequate infrastructure, and low awareness deter the full recognition of IL's perspective. By applying organized IL strategies and expanding digital access, university libraries can significantly contribute to quality education. Additionally, they can promote social inclusion and support sustainable development by developing partnerships and integrating technology. The study identifies the demand for institutional commitment and stakeholder appointment to confirm the durable success of IL initiatives. As a developing country, Bangladesh strives toward attaining the SDGs, and improving IL programs in university libraries will contribute to making a more knowledgeable, capable, and informally liable generation.

In conclusion, this study explores the role of university libraries in promoting IL and their contribution to the UN SDGs in Bangladesh. The findings reveal opportunities and challenges, weak policies, and low awareness. At the same time, the study identifies strategies and frameworks that can make IL initiatives more effective and sustainable. Overall, this work aims to support libraries in becoming stronger partners in education, digital literacy, and lifelong learning for national progress.

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**APPENDIX**

## Questionnaire set-1

Confidential

Sample No.: ... ..

**Research questionnaire**  
(University library professionals)

**Promoting Information Literacy for Achieving Sustainable Development  
Goals: The Role of University Libraries in Bangladesh**

Respected Respondent,

I am pursuing PhD at the University of Dhaka (DU) on the title “*Promoting Information Literacy for Achieving Sustainable Development Goals: The Role of University Libraries in Bangladesh*” under the supervision of Professor Dr. Kazi Mostak Gausul Hoq, University of Dhaka.

[Information literacy (IL) Programme is designed to help students, researchers and staff to learn IL skills, develop a critical approach to dealing with information and to make the best use of the physical and digital library. United Nations Sustainable Development Goals (UN SDGs) aim to transform our world. They are a call to action to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice and prosperity.]

Your insights as a university library administrator or library professional are invaluable for understanding the role of university libraries in achieving UN SDGs through IL in Bangladesh. The information collected will contribute to the research aimed at enhancing the effectiveness of university libraries. This survey is strictly confidential and will be used only for academic research, and your identity will be anonymous. Please provide your thoughtful responses to the following questions.

I would appreciate if you could kindly spend 5 or 10 minutes to fill up the questionnaire.

Sincerely Yours,

Supervisor

Researcher

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**Section 1: Demographic information**

- 1.1 Name of the library .....
- 1.2 Establishment year .....
- 1.3 University Category  Public  Private  International
- 1.4 Gender:  Female  Male
- 1.5 Designation:  Librarian  Deputy Librarian  Asst. Librarian  
 Library Officer  Asst. library Officer  Cataloguer  
 Other: .....
- 1.6 Age group:  Under 25 years  26 - 30 years  31 - 40 years  
 41 - 45 years  46 - 50 years  51 - 55 years  
 56 years and above years
- 1.7 Job experience  Less than 5 years  6 - 10 years  11 - 15 years  
 16 - 20 years  More than 21 years
- 1.8 Highest education level  PhD  MPhil  Masters  
 Bachelor  Diploma

**Section 2: Current status of IL initiatives**

- 2.1 How long has the IL program been in place in your library?  
 Less than 1 year  
 1-3 years  
 4-6 years  
 6-9 years  
 10 years and above
- 2.2 How would you rate the current IL initiatives in your library?  
 Very ineffective  
 Ineffective  
 Moderately effective  
 Effective  
 Very effective
- 2.3 How would you rate on uniformity of IL initiatives the libraries?  
 Very low  
 Low  
 Moderate  
 High  
 Very high
- 2.4 IL initiatives vary in public and private university libraries in Bangladesh.  
 Strongly disagree  
 Disagree  
 Neutral  
 Agree  
 Strongly agree

2.5 There is a standardized IL program structure in the university libraries of Bangladesh.

- Strongly disagree  
 Disagree  
 Neutral  
 Agree  
 Strongly agree

2.6 Which of the following IL activities does your library currently offer? *(Check all that apply)*

- Library orientation program  
 Workshops and seminars  
 Instructions on theories and practice  
 Organize research trends program  
 In-house training sessions  
 IL-integrated course modules  
 Printed guides and manuals  
 Instructions to teaching-learning materials  
 Other (Please specify) .....

### Section 3: Relationship between IL and UN SDGs

3.1 How aware are you of IL and SDGs?

- Not aware at all  
 Somewhat aware  
 Neutral/Uncertain  
 Very aware  
 Extremely aware

3.2 How important is it for your library to understand the SDGs?

- Not important at all  
 Slightly Important  
 Moderately Important  
 Very Important  
 Extremely Important

3.3 How much engaged are you with SDGs?

- Not engaged  
 Rarely Engaged  
 Moderately Engaged  
 Somewhat Engaged  
 Actively engaged

3.4 How much do you agree with IL's impact on achieving SDGs?

- Strongly disagree  
 Disagree  
 Moderately Agree  
 Agree  
 Strongly agree

3.5 How much have you contributed to the SDGs through your services?

- I did not contribute  
 Contributed slightly  
 Neutral  
 Contributed moderately  
 Contributed significantly

*Questionnaire set-1*

3.6 Which SDGs do you think are most impacted by your library's IL programs? *(Select all that apply)*

- SDG 1: No Poverty  
 SDG 2: Zero Hunger  
 SDG 3: Good Health and Well-being  
 SDG 4: Quality Education  
 SDG 5: Gender Equality  
 SDG 6: Clean Water and Sanitation  
 SDG 7: Affordable and Clean Energy  
 SDG 8: Decent Work and Economic Growth  
 SDG 9: Industry, Innovation, and Infrastructure  
 SDG 10: Reduced Inequality  
 SDG 11: Sustainable Cities and Communities  
 SDG 12: Responsible Consumption and Production  
 SDG 13: Climate Action  
 SDG 14: Life below Water  
 SDG 15: Life on Land  
 SDG 16: Peace, Justice, and Strong Institutions  
 SDG 17: Partnerships for the Goals

3.7 In your opinion, how does the university library promote IL programs that influence user engagement and knowledge-sharing activities in the following areas?

[You are requested to give your opinion on the agreement on the following statements. *(5-point scale considers as from 1= Strongly disagree, 2= Disagree, 3= Neither disagree nor agree, 4= Agree, and 5= Strongly agree)*]

| SL | Statement                                                                                            | <i>(1= Strongly disagree to 5= Strongly agree)</i> |   |   |   |   |
|----|------------------------------------------------------------------------------------------------------|----------------------------------------------------|---|---|---|---|
| 1  | The library can offer user orientation training programs                                             | 1                                                  | 2 | 3 | 4 | 5 |
| 2  | The library can organize workshops and webinars on IL topics e.g. search, use online sources         | 1                                                  | 2 | 3 | 4 | 5 |
| 3  | The library can offer training to help users to use the Internet and other digital tools effectively | 1                                                  | 2 | 3 | 4 | 5 |
| 4  | Library can offer services about plagiarism and how to avoid it                                      | 1                                                  | 2 | 3 | 4 | 5 |
| 5  | The library should have physical and digital resources, databases, and learning materials            | 1                                                  | 2 | 3 | 4 | 5 |
| 6  | The library can offer online tutorials to teach information literacy skills                          | 1                                                  | 2 | 3 | 4 | 5 |
| 7  | The library can offer personalized research assistance to help users find information.               | 1                                                  | 2 | 3 | 4 | 5 |
| 8  | The library can collaborate with faculty members to promote IL in academic activities                | 1                                                  | 2 | 3 | 4 | 5 |
| 9  | The library can encourage users to use online reference services                                     | 1                                                  | 2 | 3 | 4 | 5 |
| 10 | The library colleagues can be enthusiastic about offering IL-related activities.                     | 1                                                  | 2 | 3 | 4 | 5 |

*Questionnaire set-1*

3.8 To what extent do you agree on user engagement and knowledge-sharing facilities in IL programs for achieving SDGs in the following areas?

| SL | Statement                                                                 | <i>(1= Strongly disagree to 5= Strongly agree)</i> |   |   |   |   |
|----|---------------------------------------------------------------------------|----------------------------------------------------|---|---|---|---|
| 1  | Participation in IL workshops or training sessions offered by the library | 1                                                  | 2 | 3 | 4 | 5 |
| 2  | Motivation to use the library's IL resources                              | 1                                                  | 2 | 3 | 4 | 5 |
| 3  | Provision of IL programs that meet learning needs                         | 1                                                  | 2 | 3 | 4 | 5 |
| 4  | Application of IL skills from the library to routine operations           | 1                                                  | 2 | 3 | 4 | 5 |
| 5  | Assistance in community involvement and initiatives                       | 1                                                  | 2 | 3 | 4 | 5 |
| 6  | Sharing the IL skills with colleagues in everyday services                | 1                                                  | 2 | 3 | 4 | 5 |
| 7  | Taking strategies to increase user participation in the IL initiatives    | 1                                                  | 2 | 3 | 4 | 5 |
| 8  | Taking user feedback to improve the effectiveness of IL programs          | 1                                                  | 2 | 3 | 4 | 5 |
| 9  | Tracking user engagement through different activities                     | 1                                                  | 2 | 3 | 4 | 5 |
| 10 | Taking initiatives to promote user skills and higher study                | 1                                                  | 2 | 3 | 4 | 5 |

3.9 To what extent do you agree on the institutional policy and support that moderate the influence of IL skills on employees' ability to contribute for achieving SDGs to the following areas?

| SL | Statement                                                                                                                                | <i>(1= Strongly disagree to 5= Strongly agree)</i> |   |   |   |   |
|----|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---|---|---|---|
| 1  | The university library policies influence the effectiveness of IL programs.                                                              | 1                                                  | 2 | 3 | 4 | 5 |
| 2  | The university library should have well funding policy to improve the quality of library resources.                                      | 1                                                  | 2 | 3 | 4 | 5 |
| 3  | Institutional support affects library staff motivation and program outcomes.                                                             | 1                                                  | 2 | 3 | 4 | 5 |
| 4  | The financial constraints of the library impact the delivery and reach of IL initiatives.                                                | 1                                                  | 2 | 3 | 4 | 5 |
| 5  | The library adapts IL programs to address the diverse student needs.                                                                     | 1                                                  | 2 | 3 | 4 | 5 |
| 6  | The library should identify cultural and social barriers to adopting the IL in the activities.                                           | 1                                                  | 2 | 3 | 4 | 5 |
| 7  | The library can minimize the impact of the digital divide through IL skill development.                                                  | 1                                                  | 2 | 3 | 4 | 5 |
| 8  | The library's limited online resources influence the effectiveness of online IL resources.                                               | 1                                                  | 2 | 3 | 4 | 5 |
| 9  | The university's adequate support such as funding and budget need for library IL initiatives.                                            | 1                                                  | 2 | 3 | 4 | 5 |
| 10 | Collaboration between the library and the university administration, emphasizing a strategic approach to achieving SDG goals through IL. | 1                                                  | 2 | 3 | 4 | 5 |

*Questionnaire set-1*

3.10 To what extent do you agree on achieving SDGs through IL programs in the following areas?

| SL | Contributions                                                                                                                     | <i>(1= Strongly disagree to 5= Strongly agree)</i> |   |   |   |   |
|----|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---|---|---|---|
| 1  | The university library IL programs work to reduce poverty by helping to get jobs SDG-1: No poverty                                | 1                                                  | 2 | 3 | 4 | 5 |
| 2  | IL programs work to end hunger by offering information ensuring SDG-2: Zero hunger                                                | 1                                                  | 2 | 3 | 4 | 5 |
| 3  | IL programs contribute to improving the quality of education (SDG-4)                                                              | 1                                                  | 2 | 3 | 4 | 5 |
| 4  | IL programs empower women and provide equal access to all to ensure SDG 5: Gender equality                                        | 1                                                  | 2 | 3 | 4 | 5 |
| 5  | IL skills help to achieve career development or job-seeking activities ensuring SDG-8: Decent work and economic growth            | 1                                                  | 2 | 3 | 4 | 5 |
| 6  | IL programs address the social and digital inequality-related issues to ensure SDG 10: Reduced inequality                         | 1                                                  | 2 | 3 | 4 | 5 |
| 7  | IL programs collaborate with departments and other offices of the university to ensure SDG 17: Partnerships for the Goals         | 1                                                  | 2 | 3 | 4 | 5 |
| 8  | IL programs promote sustainable practices among students, supporting SDG 12: Responsible Consumption and Production               | 1                                                  | 2 | 3 | 4 | 5 |
| 9  | IL programs support health and well-being by providing resources on health literacy, supporting SDG 3: Good Health and Well-being | 1                                                  | 2 | 3 | 4 | 5 |
| 10 | IL programs raise awareness on climate-related information to encourage action, supporting SDG 13: Climate Action                 | 1                                                  | 2 | 3 | 4 | 5 |

**Section 4: Recommendations and best practices on IL and UN SDGs**

4.1 In what ways do you believe the library’s IL programs contribute to the academic and personal growth of the university community?

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4.2 What challenges do you encounter in designing or delivering IL programs, and how do these challenges affect program outcomes?

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*Questionnaire set-1*

4.3 What recommendations would you suggest to enhance the role of university libraries in Bangladesh in achieving the SDGs through IL?

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**Thank you for your participation.**

## Questionnaire set-2

*Confidential**Sample No.: .....***Research questionnaire**

(University library users)

**Promoting Information Literacy for Achieving Sustainable Development  
Goals: The Role of University Libraries in Bangladesh**

Respected Respondent,

I am pursuing PhD at University of Dhaka (DU) on the title “Promoting Information Literacy for Achieving Sustainable Development Goals: the Role of University Libraries in Bangladesh” under the supervision of Professor Dr. Kazi Mostak Gausul Hoq, University of Dhaka.

[Information literacy (IL) Programme is designed to help students, researchers and staff to learn IL skills, develop a critical approach to dealing with information and to make the best use of the physical and digital library. The Sustainable Development Goals (SDGs) aim to transform our world. They are a call to action to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice and prosperity.]

Your insights as a university library user are invaluable for understanding the role of university libraries in achieving UN SDGs through IL in Bangladesh. The information will contribute to the research aimed at enhancing the effectiveness of university libraries. This survey is strictly confidential and will be used only for academic research, and your identity will be anonymous. Please provide your thoughtful responses to the following questions.

I would appreciate if you could kindly spend 5 or 10 minutes to fill up the questionnaire.

Sincerely Yours,

Supervisor

Researcher

**Dr. Kazi Mostak Gausul Hoq**

Professor  
Information Science and Library Management  
University of Dhaka  
Email: kmgh.sharif@gmail.com

**Anita Helen**

Doctoral Student, Information Science and  
Library Management, University of Dhaka  
Reg. No: 32/2021-2022  
Session: 2021-2022  
Email: anitahelen31@gmail.com

**Section 1: Demographic information**

1.1 University Name: .....

1.2 Type of University:  Public  Private  International

1.3 Gender  Female  Male

1.4 Type of users  Teacher  PhD Researcher  MPhil Researcher  
 Master's Student  Honor's Student  Other:.....

1.5 Age group  Under 21 years  21 - 25 years  26 - 30 years  
 31 - 35 years  36-40 years  41- 45 years  
 46- 50 years  51- 55 years  56 years and above

1.6 How often do you visit the library? [Please put a tick (√)]

Daily  Twice a week  Weekly  
 Fortnightly  Monthly  Occasionally

**Section 2: Awareness, use, and level of satisfaction on IL services**

2.1 Are you aware of the IL programs offered by your university library?

- Yes  
 No  
 Not sure

2.2 Have you ever participated in any IL programs or workshops offered by the library?

- Yes  
 No

2.3 How important do you think IL is for your academic success?

- Not important at all  
 Not important  
 Neutral  
 Important  
 Very important

2.4 How would you rate your own IL skills?

- Very weak  
 Weak  
 Adequate  
 Strong  
 Very strong

2.5 Mention the level of satisfaction towards following IL promotional activities provided by the library. [You are requested to put a tick (√) on your satisfaction level on the following services.]

| IL activities                    | Satisfaction level |                |           |                |                  |
|----------------------------------|--------------------|----------------|-----------|----------------|------------------|
|                                  | Not satisfied      | Less satisfied | Satisfied | Very satisfied | Highly satisfied |
| Workshop and seminar             |                    |                |           |                |                  |
| Training on the research program |                    |                |           |                |                  |
| Library orientation program      |                    |                |           |                |                  |
| Online literacy program          |                    |                |           |                |                  |
| Consultancy program              |                    |                |           |                |                  |

2.6 How do you rate your overall satisfaction level with the IL program provided by your library?

- Very dissatisfied  
 Dissatisfied  
 Neutral  
 Satisfied  
 Very satisfied

### Section 3: Impact of IL on Academic and SDGs

3.1 To what extent have the library's IL programs helped you in your academic work?

- Not at all  
 Very little  
 Neutral  
 To some extent  
 To a great extent

3.2 Do you think the IL skills you have learned are applicable beyond your academic life (e.g., in your career, personal decisions, or community involvement)?

- No, not at all  
 No, not really  
 Not sure  
 Yes, somewhat  
 Yes, definitely

3.3 Do you believe that IL contributes to broader societal goals such as those outlined in the SDGs?

- Not, not at all  
 No, not really  
 Not sure  
 Yes, somewhat  
 Yes, strongly

### Section 4: Challenges and obstacles

4.1 What challenges have you faced in trying to develop your IL skills? (5-point scale considers as from 1= Strongly disagree, 2= Disagree, 3= Neither disagree nor agree, 4= Agree, and 5= Strongly agree) [You are requested to put a tick (√) on your satisfaction level on the following services.]

| SL    | Challenges                            | <i>(1= Strongly disagree to 5= Strongly agree)</i> |   |   |   |   |
|-------|---------------------------------------|----------------------------------------------------|---|---|---|---|
| 4.1.1 | Lack of time                          | 1                                                  | 2 | 3 | 4 | 5 |
| 4.1.2 | Lack of awareness of IL programs      | 1                                                  | 2 | 3 | 4 | 5 |
| 4.1.3 | IL programs not meeting my needs      | 1                                                  | 2 | 3 | 4 | 5 |
| 4.1.4 | Difficulty accessing IL resources     | 1                                                  | 2 | 3 | 4 | 5 |
| 4.1.5 | Inadequate support from library staff | 1                                                  | 2 | 3 | 4 | 5 |

4.2 What do you think could be done to make IL programs more accessible and useful for students? [You are requested to put a tick (√) on your satisfaction level on the following services.]

| SL    | Thoughts                                       | <i>(1= Strongly disagree to 5= Strongly agree)</i> |   |   |   |   |
|-------|------------------------------------------------|----------------------------------------------------|---|---|---|---|
| 4.2.1 | Offer IL programs online and on-demand         | 1                                                  | 2 | 3 | 4 | 5 |
| 4.2.2 | Integrate IL into the academic curriculum      | 1                                                  | 2 | 3 | 4 | 5 |
| 4.2.3 | Increase promotion and awareness campaigns     | 1                                                  | 2 | 3 | 4 | 5 |
| 4.2.4 | Customize IL programs for different user needs | 1                                                  | 2 | 3 | 4 | 5 |
| 4.2.5 | Provide consultation services                  | 1                                                  | 2 | 3 | 4 | 5 |

### Section 5: Perception towards library support and services

5.1 How supportive do you find the library staff in helping you develop IL skills?

- Very unsupportive  
 Unsupportive  
 Neutral  
 Supportive  
 Very supportive

5.2. What additional services or resources would you like the library to provide to enhance your IL skills? [You are requested to put a tick (√) on your satisfaction level on the following services.]

| SL    | Service or resources                                  | <i>(1= Strongly disagree to 5= Strongly agree)</i> |   |   |   |   |
|-------|-------------------------------------------------------|----------------------------------------------------|---|---|---|---|
| 5.2.1 | Advance IL workshops and seminars                     | 1                                                  | 2 | 3 | 4 | 5 |
| 5.2.2 | Access to interactive IL tutorials and online courses | 1                                                  | 2 | 3 | 4 | 5 |
| 5.2.3 | Dedicated IL support desk or chat service             | 1                                                  | 2 | 3 | 4 | 5 |
| 5.2.4 | Regular IL newsletters or update                      | 1                                                  | 2 | 3 | 4 | 5 |
| 5.2.5 | Collaboration spaces for group study and IL practice  | 1                                                  | 2 | 3 | 4 | 5 |

5.3. What resources do you think are most lacking in your library for promoting IL programs aimed at achieving the SDGs? (5-point scale considers as from 1= Strongly disagree, 2= Disagree, 3= Neither disagree nor agree, 4= Agree, and 5= Strongly agree) [You are requested to put a tick (√) on your satisfaction level on the following services.]

| SL    | Lacking                                                        | (1= Strongly disagree to 5= Strongly agree) |   |   |   |   |
|-------|----------------------------------------------------------------|---------------------------------------------|---|---|---|---|
| 5.3.1 | Financial resources and budget allocation                      | 1                                           | 2 | 3 | 4 | 5 |
| 5.3.2 | Trained personnel with expertise in both IL and SDGs           | 1                                           | 2 | 3 | 4 | 5 |
| 5.3.3 | Technological infrastructure (e.g., software, digital tools)   | 1                                           | 2 | 3 | 4 | 5 |
| 5.3.4 | Educational materials and resources tailored to SDGs           | 1                                           | 2 | 3 | 4 | 5 |
| 5.3.5 | Institutional support and collaboration with other departments | 1                                           | 2 | 3 | 4 | 5 |
| 5.3.6 | User engagement and participation                              | 1                                           | 2 | 3 | 4 | 5 |

5.4 How do you perceive the effectiveness of the strategies and resources currently available in university libraries of Bangladesh for promoting IL programs aimed at achieving the SDGs? [You are requested to put a tick (√) on your satisfaction level on the following services.]

- Very effective
- Somewhat effective
- Neutral
- Somewhat lacking
- Very lacking

### Section 6: Recommendations and best practices

6.1. What suggestions do you have for improving the IL programs in your university library? (5-point scale considers as from 1= Strongly disagree, 2= Disagree, 3= Neither disagree nor agree, 4= Agree, and 5= Strongly agree) [You are requested to put a tick (√) on your satisfaction level on the following services.]

| SL    | Recommendations                                       | (1= Strongly disagree to 5= Strongly agree) |   |   |   |   |
|-------|-------------------------------------------------------|---------------------------------------------|---|---|---|---|
| 6.1.1 | Tailor IL programs to specific academic disciplines   | 1                                           | 2 | 3 | 4 | 5 |
| 6.1.2 | Increase collaboration between librarians and faculty | 1                                           | 2 | 3 | 4 | 5 |
| 6.1.3 | Expand the variety of IL resources and materials      | 1                                           | 2 | 3 | 4 | 5 |
| 6.1.4 | Implement regular feedback mechanisms                 | 1                                           | 2 | 3 | 4 | 5 |
| 6.1.5 | Offer more flexible scheduling and formats            | 1                                           | 2 | 3 | 4 | 5 |
| 6.1.6 | Promote IL programs more effectively                  | 1                                           | 2 | 3 | 4 | 5 |

*Questionnaire set-2*

6.2. How can the library better contribute to your personal and academic development through IL? (5-point scale considers as from 1= Strongly disagree, 2= Disagree, 3= Neither disagree nor agree, 4= Agree, and 5= Strongly agree) [You are requested to put a tick (√) on your satisfaction level on the following services.]

| SL    | Way of better contribution                                   | <i>(1= Strongly disagree to 5= Strongly agree)</i> |   |   |   |   |
|-------|--------------------------------------------------------------|----------------------------------------------------|---|---|---|---|
| 6.2.1 | Provide personalized IL coaching sessions                    | 1                                                  | 2 | 3 | 4 | 5 |
| 6.2.2 | Integrate IL into an academic advising and mentoring program | 1                                                  | 2 | 3 | 4 | 5 |
| 6.2.3 | Host IL-themed workshops and events                          | 1                                                  | 2 | 3 | 4 | 5 |
| 6.2.4 | Create a repository of IL success stories and best practices | 1                                                  | 2 | 3 | 4 | 5 |
| 6.2.5 | Facilitate peer-to-peer learning and support groups          | 1                                                  | 2 | 3 | 4 | 5 |
| 6.2.6 | Offer specialized IL resources for career development        | 1                                                  | 2 | 3 | 4 | 5 |

6.3. What suggestions do you have for enhancing the role of libraries for achieving SDG?

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**Thank you for sharing your thoughts.**