ORGANIZATIONAL LIFE CYCLE SUSTAINABILITY OF HIGHER EDUCATION IN AFGHANISTAN

By

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Higher education institutions (HEI) significantly affect the environment, economy and society. Even though the rising importance of sustainability in higher education, there is lack of comprehensive studies on organizational sustainability in poor and developing countries context. The study objectives are to evaluate the Kabul University Environmental impacts applying the organizational life cycle assessment (O-LCA), calculate higher education costs using life cycle costing (LCC), and assess the social performance using social organizational life cycle assessment (SO-LCA) in relation to the concept of sustainability. The study makes a unique contribution to the application of OLCSA within a poor country's higher education system and enhances the understanding of comprehensive sustainability challenges in these contexts. This study addresses the gap in the literature regarding the sustainability assessment of universities in developing countries. The ISO/ST 14072 standard was utilized for the O-LCA study by using the ReCiPe 2016 method and using SimaPro software. The research examined the activities of the university in 2021 and categorized them into three damage assessment areas: human health, ecosystem, and resources. The

UNEP/SETAC 2020 guidelines were used to assess the social performance of Kabul University. Furthermore, an LCC study was conducted to evaluate the costs of Kabul University, and OLCSA integrated the data of O-LCA, LCC, and SO-LCA using a scoring technique, and LCT triangle visually represented all three dimensions of sustainability. In alignment with the objectives of the environmental dimension of sustainability the research findings of O-LCA revealed that electricity use, transportation, and building operations are key contributors to environmental impacts, with significant impacts on fine particulate matter generation (16.24 DALY) and global warming's impact on human health (8.56 DALY). Furthermore, the LCC analysis showed that the cost per reporting unit (one student) for six-year graduation period at Kabul University is approximately AFs 792,277 (USD 11,174), while for five-year, it is AFs 660,231 (USD 9,311), and for a four-year it is approximately AFs 528,185 (USD 7,449). These figures indicate a need for strategic financial planning to enhance economic sustainability. The SO-LCA revealed varying of satisfaction among university stakeholders. The SO-LCA identified moderate satisfaction among students and administrative staff, while highlighting the areas for improvement in academia category, particularly regarding fair salary and discrimination. This emphasizes the need for targeted social policies to improve stakeholders' satisfaction. Regarding the integration of sustainability dimensions, the findings indicate that the values for the social, environmental, and economic dimensions are 3.06, 2.3, and 0.8 respectively. This suggests that the environmental and social dimensions contribute more significantly to sustainability than the economic dimension. This underlines the urgent necessity for economic improvement to achieve balanced sustainability. In conclusion, these findings provide a framework for assessing sustainability in HEIs in poor countries, with potential applications in similar contexts worldwide. The finding

aligning with and contribute to SDG 4 (Quality Education) and SDG 11 (Sustainable Cities and Communities) offering insight for sustainable development in higher education. Additionally Kabul University can serve as a model for other institutions in the region and contribute to the achievement of SDGs 2030.

Keywords: Higher education institution sustainability, Organizational life cycle sustainability assessment, Social organization life cycle assessment, Sustainability triangle

SDG: GOAL 4: Quality Education, GOAL 11: Sustainable Cities and Communities

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KEMAMPANAN KITARAN HIDUP ORGANISASI PENGAJIAN TINGGI DI AFGHANISTAN

Oleh

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Institusi pengajian tinggi (IPT) memberi impak yang ketara kepada alam sekitar, ekonomi dan masyarakat. Walaupun kepentingan kemampanan yang semakin meningkat dalam pendidikan tinggi, terdapat kekurangan kajian komprehensif tentang kemampanan organisasi dalam konteks negara membangun dan membangun. Objektif kajian adalah untuk menilai impak Alam Sekitar Universiti Kabul yang menggunakan penilaian kitaran hayat organisasi (O-LCA), mengira kos pendidikan tinggi menggunakan pengekosan kitaran hayat (LCC), dan menilai prestasi sosial menggunakan penilaian kitaran hayat organisasi sosial (SO-LCA) berhubung dengan konsep kemampanan. Kajian ini memberikan sumbangan unik kepada aplikasi OLCSA dalam sistem pendidikan tinggi negara miskin dan meningkatkan pemahaman tentang cabaran kemampanan yang komprehensif dalam konteks ini. Kajian ini menangani jurang dalam literatur mengenai penilaian kemampanan universiti di negara membangun. Piawaian ISO/ST 14072 telah digunakan untuk kajian O-LCA dengan menggunakan kaedah ReCiPe 2016 dan menggunakan perisian SimaPro. Penyelidikan itu meneliti aktiviti universiti pada tahun 2021 dan mengkategorikannya

kepada tiga bidang penilaian kerosakan: kesihatan manusia, ekosistem dan sumber. Garis panduan UNEP/SETAC 2020 digunakan untuk menilai prestasi sosial Universiti Kabul. Tambahan pula, kajian LCC telah dijalankan untuk menilai kos Universiti Kabul, dan OLCSA menyepadukan data O-LCA, LCC, dan SO-LCA menggunakan teknik pemarkahan, dan segi tiga LCT secara visual mewakili ketiga-tiga dimensi kemampanan. kesan ke atas penjanaan zarahan halus (16.24 DALY) dan kesan pemanasan global terhadap kesihatan manusia (8.56 DALY). Tambahan pula, analisis LCC menunjukkan bahawa kos setiap unit pelaporan (seorang pelajar) untuk tempoh tamat pengajian selama enam tahun di Universiti Kabul adalah kira-kira AF 792,277 (USD 11,174), manakala untuk tempoh tamat pengajian lima tahun, ia adalah AFs 660,231 (USD 9,311), dan untuk tempoh empat tahun, AF28 adalah kira-kira 58. (USD 7,449). Angka-angka ini menunjukkan keperluan untuk perancangan kewangan strategik untuk meningkatkan kemampanan ekonomi. SO-LCA mendedahkan pelbagai kepuasan di kalangan pihak berkepentingan universiti. , SO-LCA mengenal pasti kepuasan sederhana dalam kalangan pelajar dan kakitangan pentadbiran, sambil mengetengahkan bidang untuk penambahbaikan dalam kategori akademik, khususnya mengenai gaji yang adil dan diskriminasi. Ini menekankan keperluan dasar sosial yang disasarkan untuk meningkatkan kepuasan pihak berkepentingan. Mengenai integrasi dimensi kelestarian, dapatan menunjukkan bahawa nilai bagi dimensi sosial, alam sekitar dan ekonomi masing-masing adalah 3.06, 2.3, dan 0.8. Ini menunjukkan bahawa dimensi alam sekitar dan sosial menyumbang lebih signifikan kepada kemampanan daripada dimensi ekonomi. Ini menggariskan keperluan mendesak untuk peningkatan ekonomi untuk mencapai kemampanan yang seimbang. Kesimpulannya, penemuan ini menyediakan rangka kerja untuk menilai dan meningkatkan kemampanan di IPT di negara miskin, dengan aplikasi berpotensi dalam konteks yang sama di seluruh dunia. Penemuan yang sejajar dan menyumbang kepada SDG 4 (Pendidikan Berkualiti) dan SDG 11 (Bandar dan Komuniti Lestari) yang menawarkan wawasan untuk pembangunan mampan dalam pendidikan tinggi. Selain itu, Universiti Kabul boleh menjadi model untuk institusi lain di rantau ini dan menyumbang kepada pencapaian SDG 2030.

Kata Kunci: Kemampanan institusi pendidikan tinggi, Penilaian kelestarian kitaran hayat organisasi, Penilaian kitaran hayat organisasi sosial, Segitiga kelestarian

SDG: MATLAMAT 4: Pendidikan Berkualiti, MATLAMAT 11: Bandar dan Komuniti Mampan

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LIST OF ABBREVIATIONS

ABC	Activity-based Costing
CE	Circular Economy
CO_2	Carbon Dioxide
CVI	Content Validity Index
ELCA	Environmental Life Cycle Assessment
E-LCC	Environmental Life Cycle Costing
EMS	Environmental Management System
GHGs	Greenhouse Gases
GRI	Global Reporting Initiatives
HEIs	Higher Education Institutions
HFMI	High-Frequency Mechanical Impact
I-CVI	Item-Level Content Validity Index
ISO	International Organization for Standardization
IUCN	Intern Union for Conservation of Nature
LCA	Life Cycle Assessment
LCC	Life Cycle Costing
LCCA	Life Cycle Cost Analysis
LCI	Life Cycle Inventory
LCIA	Life Cycle Impact Assessment
LCM	Life Cycle Management
LCSA	Life Cycle Sustainability Assessment
LCT	Life Cycle Thinking
MSME	Micro, Small, and Medium-sized Enterprise
NGOs	Non-Governmental Organizations
NPV	Net Present value

OEF	Organization Environmental Footprint
O-LCA	Organizational Life Cycle Assessment
OLCC	Organizational Life Cycle Costing
OLCSA	Organizational Life Cycle Sustainability Assessment
PBP	Payback Period
REF	Research Excellence Framework
S-CVI	Scale-Level Content Validity Index
SDGs	Sustainable Development Goals
SETAC	Society of Environment Toxicology and Chemistry
S-LCA	Social Life Cycle Assessment
SLCIA	Social Life Cycle Impact Assessment
SO-LCA	Social Organizational Life Cycle Assessment
UN	United Nations
UNEP	United Nations Environment Program
UPV	Universitat Politècnica de València

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Higher education institutions (HEIs) play an important role in fostering sustainable communities, but they also have substantial environmental, economic, and social impacts (Kaplan, 2000; Pata et al., 2021; Wu et al., 2023). This study examines Kabul University, Afghanistan's oldest and largest public university, to determine its organizational sustainability through a full life cycle methodology. By studying Kabul University's sustainability performance, this study hopes to shed light on the challenges and opportunities that higher education institutions confront in post-conflict and developing countries.

Universities around the world are increasingly recognizing their obligation to support sustainable development. This involves not just educating students about sustainability, but also integrating sustainable practices into their operations and engaging with larger societal issues (Lozano et al., 2015). However, assessing the sustainability of HEIs, particularly in developing and poor countries settings, remains a problematic matter that requires novel methodologies.

In September 2015, with the adoption of 17 Sustainable Development Goals (SDGs), the United Nations (UN) reaffirmed the need to take immediate action to conserve natural resources and the environment. The primary reason for this emphasis is that global concerns, such as climate change, water scarcity, and resource depletion, are negatively impacting people's lives and national economies, hence limiting the prospect of global sustainable development. In this context, a growing number of firms have recognized the significance of utilizing tools and processes to assist them in determining how to reduce the environmental impacts of their products and activities (Manzardo, Loss, Niero, et al., 2018).

According to the 1987 Bruntland Commission, sustainable development is "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Keeble, 1988). To accomplish sustainable development objectives, policymakers evaluate the sustainability of products and processes considering environmental, social, and economic issues. Thus, policymakers are cautious when making judgments regarding a product or process to avoid negative repercussions and enhance favorable impacts that will promote sustainability. According to Soni et al. (2016), education is vital to achieving sustainable development goals.

Higher education institutions (HEIs) in developing countries, especially those in post-conflict settings, encounter distinct and intricate sustainability obstacles. These challenges are frequently worsened by scarce resources, impaired infrastructure, and the necessity to reconstruct social and educational systems (Babury & Hayward, 2013). Universities in Afghanistan are also facing problems and challenges like the requirement for faculty development and quality assurance (Mussawy & Rossman, 2021). These complex issues must be addressed in the struggle to rebuild and reform higher education in the nation while aiming for sustainability (Hayward & Babury, 2014).

Universities in Afghanistan face comparable sustainability problems and issues to those encountered by other post-conflict countries in the area. For example, universities in Iraq confront challenges in maintaining academic staff, rehabilitation of infrastructure, and modernizing courses to fulfill the demands (Al-Husseini & Elbeltagi, 2015). Similar challenges await Syrian universities in terms of rebuilding classrooms, dealing with the departure of qualified faculty, and reintegrating displaced students (Watenpaugh et al., 2014).

The common issues of scarce resources, brain drain, and damaged infrastructure have a substantial influence on sustainability initiatives in these post-conflict environments. These elements work together to make it difficult for universities in Afghanistan, Iraq, and Syria to adopt sustainable practices, highlighting the need for focused interventions that address resource constraints, infrastructure development, and capacity building (Mussawy & Rossman, 2021).

Afghan higher education context exemplifies these challenges in a compelling manner. Following a prolonged period of strife, Afghanistan's tertiary education system has encountered substantial obstacles in its efforts to reconstruct and update. Several crucial concerns include: (1) insufficient infrastructure, where numerous universities suffer from a dearth of fundamental facilities and equipment essential for providing high-quality education and conducting research; furthermore, capacity building is urgently required to cultivate competent faculty and staff, as numerous academics departed during times of conflict; (2) curriculum relevance, as obsolete curricula frequently neglect to tackle local requirements and global sustainability issues; (3) gender equity, where women and girls face significant inequalities in their ability to access higher education; and (4) quality assurance, covering the task of creating and upholding educational benchmarks that continues to be a difficult endeavor (Azimi & Balakarzai, 2020). The challenges mentioned have a direct effect on Afghanistan's capacity to advance toward the UN SDGs, specifically SDG 4 (Quality Education) and SDG 11 (Sustainable Cities and Communities).

The impact of conflict on Afghanistan’s higher education system can be compared to other conflict-affected countries. For example, in Iraq and Syria, the higher education system faced similar challenges from 2003 invasion in Iraq. Iraqi universities experienced widespread destruction of infrastructure, and mass migration of academia. Furthermore, the Syrian universities and Afghanistan also facing the same challenges(Watenpaugh et al., 2014). Additionally, Afghanistan higher education system faces unique challenges due to its special historical and cultural situation. Therefore, there are some important lessons to be learned from other conflicted countries.

Higher education institutions have a vital role in promoting peacebuilding and social reconstruction in areas affected by conflict. They function as hubs for the creation of knowledge, enhancement of skills, and promotion of social unity. Nevertheless, these establishments frequently encounter challenges, such as insufficient financial resources, loss of talented individuals, obsolete educational programs, and inadequate research capacities (Aver et al., 2021).

Using an Organizational Life Cycle Sustainability Assessment (OLCSA) methodology, this paper offers a whole picture of Kabul University's sustainability performance by integrating social, financial, and environmental aspects. Combining Organizational Life Cycle Assessment (O-LCA), Life Cycle Costing (LCC), and Social Organizational Life Cycle Assessment (SO-LCA) this study provides a complete framework for evaluating and enhancing sustainability in higher education.

Through concentrating on Kabul University, this study helps to clarify potential and sustainability issues in poor countries higher education environments. The results will not only guide Kabul University's policies and operations but also offer insightful analysis for other HEIs operating in like circumstances. Theoretical framework, methods, results, and impacts of this thorough sustainability analysis will be covered in the next chapters.

The organizational life cycle assessment (O-LCA) guidance, which is in line with ISO/TS 14072 (ISO, 2014), demonstrates how this technique can be applied, and it assists professionals in overcoming the methodological problems that arise when transitioning their focus from products to organizations (Martínez-Blanco et al., 2018). Even though the O-LCA study was used in an HEI by Lo-Iacono-Ferreira et al. (2017) with the environmental management system (EMS) combined, there are no studies about the OLCA of universities separately.

The need for a comprehensive set of programs focusing on sustainable consumption and production was stressed at the 2002 World Summit on Sustainable Development in Johannesburg. Many methods, instruments, and techniques are available for organizations to assess, compare, and display the environmental performance of their goods and services (UNEP/SETAC, 2015). ISO 14001 (ISO., 2004), known in Europe as the Eco-Management and Audit Scheme, serves as a guide for many organizations seeking certification for their EMS. These frameworks primarily assist with procedural compliance, and when incorporating an organization into an eco-balance assessment, they typically focus on the operational processes from gate to gate. The International Organization for Standardization created ISO/TS 14072 (ISO, 2014). The great majority of ISO 14044 (ISO, 2006) standards (27 out of 31) are fundamentally from products to organizations. In addition, along with the creation of the standard document, the United Nations Environment Program/Society of Environment Toxicology and Chemistry (UNEP/SETAC) Life Cycle Initiative launched the flagship project Life Cycle Assessment (LCA) of Organizations, which evaluates the capabilities and applications of LCA in organizations (UNEP/SETAC, 2015).

According to ISO/TS 14072 (ISO, 2014), organizational LCA, or O-LCA, is the process of collecting and evaluating the inputs, outputs, and possible environmental impacts of an organization's activities (ISO, 2014; UNEP/SETAC, 2015). Additionally, O-LCA is a life cycle strategy for addressing the environmental footprint of an organization. Considering the interests of stakeholders, the O-LCA method detects and measures environmental concerns that extend beyond the organization's borders. It is an environmental impact strategy because it analyzes the environmental concerns that are significant to an organization and provides a profile of its operations' potential environmental impact (Lo-Iacono-Ferreira et al., 2017).

Specifically, ISO/TS 14072 (ISO, 2014) emphasizes identifying, assessing, and interpreting the potential of environmental factors affecting organizations (ISO., 2004). Even though O-LCA is still a fairly new idea, researchers and managers have been using an LCA perspective to measure the environmental performance of an organization for a while now (Finkbeiner et al., 1999; Lo-Iacono-Ferreira et al., 2017).

Furthermore, O-LCA can be used to examine an organization's environmental performance and the advantages associated with its decision-making processes, as the technology can create the necessary data. Among the important benefits of O-LCA deployment include the provision of advisory reports and open policies (Lo-Iacono-Ferreira et al., 2017). Environmental impact profiles give the required information for an organization's decision-making to disclose environmental insights (UNEP/SETAC, 2015), and Martínez-blanco et al. (2015) demonstrated that OLCA may be utilized to anticipate scenarios and drive data-gathering programs.

The first and most accurate definition of social organizational life cycle assessment (SO-LCA) (UNEP, 2020) is "a compilation and evaluation of the social and socio-economic aspects and the positive and negative effects of the activities of the organization as a whole or a part of it from a life cycle perspective" (D'Eusanio et al., 2020; Martínez-blanco et al., 2015). The social life cycle assessment (S-LCA) outline is generally used in SO-LCA impact assessment and interpretation (Kalvani et al., 2021; Martínez-blanco et al., 2015). It is necessary to describe how SO-LCA helps in the resolution of the main concerns of S-LCA. Besides, SO-LCA is not thought to be a replacement for existing methods (Lo-Iacono-Ferreira et al., 2017). Moreover, the impact assessment and interpretation of SO-LCA are primarily based on the S-LCA outline (Martínez-blanco et al., 2015).

Higher education institutions and universities, on the other hand, play a big part in the move toward socially, environmentally, and economically safe communities. The social side of higher education transformation and the activities that go along with it play a big role in figuring out how to make the hard transition to sustainable higher education systems and societies in general (Kapitulčinová et al., 2018).

The life cycle costing (LCC) evaluates the total economic cost of a product or process across its entire life cycle. Nonetheless, the newly developed OLCC has been recently introduced for estimating organization life cycle costs (Alejandrino et al., 2022). Life cycle costing involves five steps: defining the goal, selecting the parameters, collecting data, performing the assessment, and reviewing the results (Kaewunruen et al., 2020). Finally, environmental life cycle costing (E-LCC) calculates the economic cost of items or services in terms of environmental protection. Both LCC and E-LCC evaluation methodologies are used for decision-making.

The life cycle assessment (LCA) evaluates the environmental effects of a product or process over its whole cycle of life. The LCA provides the environmental profile of a system or course based on the appraisal of massive input, output, and its significant impacts contributing to the environmental impact categories, including global warming, ozone depletion, eutrophication, ecotoxicity freshwater, and acidification (Clark, 2011; Nwodo & Anumba, 2019). The S-LCA is an approach for estimating social impacts that aims to measure the socio-economic characteristics of a product or process, and it analyzes both the negative and positive impacts throughout the product life cycle on society, including the extraction and processing of raw materials, manufacturing, distribution, usage, maintenance, recycling, and disposal of product waste (Petti et al., 2018). The LCC analyzes the cost of a product or process in the whole cycle of life. Furthermore, LCC estimates the cost of all stages including risk, investment, operation, maintenance, and demolition. Finally, the LCC delivers potential facts about the total cost of the product or process of the full life cycle to assist the decision-making process (Miah et al., 2017).

Figure 1.1 : A sustainability model adopted from (Klöpffer & Ciroth, 2011; Mälkki & Alanne, 2017; Roinioti & Koroneos, 2019)

Nowadays, considering the above-mentioned environmental, social, and economic problems as in Figure 1.1, policymakers assume the sustainability of a product or process to achieve SDGs. Therefore, the LCSA study is implicitly needed, which is the consolidation of OLCA, SO-LCA, and LCC. Consequently, policymakers will need to carefully consider the product or process to avoid the negative impacts and to improve their positive impacts that will trigger sustainability, which means that the product or service is practiced in a sustainable manner. Education is also a process and service; hence, it needs to be analyzed based on LCSA.

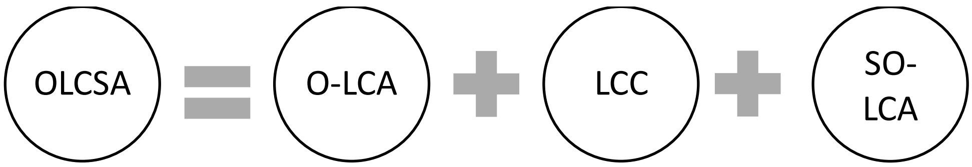

Figure 1.2 : Proposed OLCSA study

This study analyzes the environmental input and output of resources and the impact assessment of the education process needed to perform O-LCA. For the satisfaction of stakeholders, the SO-LCA should be conducted accordingly. For calculating the whole cost of an organization and its services in the whole lifespan, the LCC will be considered. Consequently, it is obligatory to analyze the O-LCA, SO-LCA, and LCC for education and consolidate them all for organizational sustainability. In addition, O-LCA, SO-LCA, and LCC will be combined to estimate the OLCSA and develop a new sustainability framework to estimate the sustainability of the education institution or university as in Figure 1.2.

1.2 Overview of Afghanistan Higher Education System

The inception of higher education in the country occurred with the establishment of the foremost and oldest university in the country, which is Kabul University. Throughout its long history since 1932, Kabul University has not only provided tertiary education services to many national students, but also enjoyed popularity in the region by attracting many students from the neighboring countries. Kabul University had a rich culture, history, and academic excellence in teaching, learning, and research endeavors before the long war and infighting. Although it has been devastated by decades of war and instabilities in Afghanistan, it remains the first choice of students in the country. Following British colonization, Afghanistan experienced a period of relative stability and openness. Higher education in Afghanistan was strongest in the late 1960s (Giustozzi, 2010).

The Ministry of Higher Education was then set up in 1973–1974 as a formal authority to manage, control, coordinate, and oversee the academic affairs of HEIs at the national level. Kabul University, which was the first HEI in the country, was run by the Ministry of Education of Afghanistan. The Ministry of Higher Education then tried to come up with a national law of higher education and related rules to give academic and research activities in the country a legal framework. Since its beginning, the national law of higher education has been changed to reflect the changes in the country's government. The most recent change and revision to the law of higher education happened on March 31, 2018, to fit the current and strategic goals of the higher education vision (Azimi & Balakarzai, 2020).

Higher education in Afghanistan dates back to 87 years before the present day. It had a time of wealth and excellence up until the middle of the 1970s, but it was destroyed during the country's three decades of civil war. Since 2002, the Ministry of Higher Education has been tirelessly working toward the goal of reconstructing and bringing about significant reforms in the system in order to institutionalize the quality of higher education available throughout the country (Azimi & Balakarzai, 2020).

By signifies of its Higher Education Development Project (HEDP), the World Bank has been instrumental in supporting higher education in Afghanistan. Aiming to boost access to higher education in Afghanistan, improve its quality and relevance, and strengthen the governance of the higher education system, this initiative spanning 2015 to 2022 sought (WorldBank, 2022). The HEDP concentrated on important areas including raising enrollment in priority degree programs, strengthening the qualifications framework, enhancing university autonomy, and so improving the quality assurance and accreditation system. Particularly target 4.3, which seeks to guarantee equal access to reasonably priced, high-quality technical, vocational, and tertiary education including university education, these goals closely match SDG 4 (World bank, 2013).

The government of Afghanistan's decision to establish the Ministry of Higher Education was a significant step in the right direction, as it encouraged provincial universities to establish one after another to offer higher education services at a national level and to facilitate potential students across the country. Within the larger task of rebuilding Afghanistan, the higher education situation is unique. More than three decades of conflict have resulted in the loss of skilled staff, where brain drain and forced relocation of technicians and academics have been a significant problem for Afghan HEIs (Roof, 2015). In this setting, where higher education is regarded to be the key to success, it is important to put the country back on the right path of progress (Azimi & Balakarzai, 2020).

Consequently, Afghanistan's higher education system has fluctuated significantly over the last few decades, impacted by political changes and conflicts. During the Taliban's first government, which lasted from 1996 to 2001, women's access to education was severely restricted. Following the fall of the Taliban in 2001, Afghanistan's education sector improved significantly. The number of schools expanded considerably, as did enrollment, particularly among girls, who had previously been virtually excluded from education under the Taliban's rule (Rauf, 2021). However, the return of the Taliban in August 2021 has once again placed great strain on the school system, erasing much of the progress made in the previous two decades (Ahmadi, 2022; Inspector, 2023).

With an eye toward corresponding educational efforts with the Sustainable Development Goals (SDGs), the United Nations and other international organizations have launched multiple projects to assist education in Afghanistan. Launched a multi-year program in 2018-2021 aiming at improving access to education for 3.7 million crisis-affected children in Afghanistan, Education Cannot Wait (ECW) in association with UNICEF and a coalition of UN, NGOs, and civil society partners launched Emphasizing inclusive and fair education, this project directly supports SDG 4 (Quality Education) and SDG 5 (Gender Equality) (Education can not wait, 2019).

With a view toward increasing access for girls especially, UNOPS has been actively building and repairing schools all throughout Afghanistan. 48 schools have been built thanks to these initiatives, so benefiting over 100,000 students (UNOPS, 2023). Addressing both educational access and the construction of sustainable infrastructure, this project corresponds with SDG 4 and SDG 9 (Industry, Innovation, and Infrastructure).

Finally, the current status of Afghan higher education is dismal, with significant constraints on academic freedom, gender inequity, and economic issues. The Taliban's return has erased many of the accomplishments made over the last two decades, putting Afghanistan's educational future in danger. When comparing Afghanistan's higher education system with that of neighboring countries, it becomes noticeable that there are common issues, as well as distinct characteristics. Pakistan, like Afghanistan, has had challenges with the availability of education, especially for women, and the assurance of its quality. Pakistan has achieved notable progress in the development of its higher education sector, particularly in the areas of research and foreign partnerships (Rehman & Younus, 2021; Zia, Tayyaba, Liu Bangfan, Muhammad Fayyaz Khokhar, Muhammad Sharif, Shamshad Akhter, 2023).

Tajikistan, a neighboring country, has faced challenges of inadequate finance and the emigration of highly-skilled individuals from its higher education system. However, it has undertaken reforms to harmonize its education system with global benchmarks (Jafar & Sabzalieva, 2022). Conversely, Afghanistan's higher education system has more profound obstacles because of prolonged conflict and political instability, rendering its recovery and development process more intricate. Addressing these difficulties requires a collaborative effort from both national and international partners to guarantee that education remains a top priority and that all Afghan kids have access to quality education.

Despite these issues, new policy reforms have been implemented to enhance the sustainability and caliber of higher education in Afghanistan. The National Higher Education Strategic Plan (2016–2020) prioritized the goals of increasing accessibility, improving quality, and enhancing the governance of the higher education system (Hayward, 2015). This plan included strategies for revising the curriculum, enhancing faculty skills, and upgrading infrastructure. Nevertheless, the execution of these plans has been impeded by political fluctuations and security concerns. The sustainability of Afghan HEIs remains a critical issue, requiring a focus on capacity building, quality assurance, and adaptation of global educational trends (Welch, Anthony, 2018).

1.3 A Glance at Kabul University

1.3.1 History of Kabul University

Kabul University is the oldest, most prestigious, and largest public university in Afghanistan. Kabul University, Afghanistan's first university, was founded in November 1932 with the Faculty of Medicine and expanded with more faculties. The political and military developments in Afghanistan over the past four decades have affected this influential university (Azimi & Balakarzai, 2020; Kabul University, 2018).

From 1932 to 1978, Kabul University developed significantly and founded Afghanistan's modern higher education system. The 1946 Kabul University Founding Law laid the groundwork for higher education in Afghanistan. Kabul University expanded structurally when the Faculty of Medicine was founded in 1932. The Faculty of Law and Political Science (1938), Science (1942), Literature (1944), Sharia (Islamic) Law (1951), Agriculture and Engineering (1956), Economics (1958), Pharmacy (1959), and Arts (1966) were established. These faculties produced the essential infrastructure, which made up about 50% of Kabul University's infrastructure. The first and second developmental plans of the Government of Afghanistan (1956–1967) prioritized university development and contemporary higher education facilities. This time saw the birth of libraries, laboratories, research centers, societies, globalization, professor capacity building, scientific research, and publications. In 1968, Kabul University had 3,860 students, 438 national professors, 186 international academics, 35 contract professors, and 714 professors involved in teaching and researching (Kabul University, 2018).

Since 1992–1978, Kabul University has seen little progress and development, where its organizational structure expanded, with the Faculty of Geology and Social Sciences (1979) and the Faculty of Journalism (1980) were added to the academic and administrative organization, and about 10% of its infrastructure would be developed. However, the Soviet Union's attack on Afghanistan in these years saw Kabul University's working relationships with other important national and international institutions destabilized or suspended, and many of the lecturers left the country. Much of the university's material and spiritual resources were destroyed by hostile parties. Female students and instructors were banned from education after the Taliban took Kabul in 1996. However, in 2001, with the arrival of a new political regime in the country, Kabul University was reopened with only 300 faculties and 3,000 students. After the 2001 political change in Afghanistan, Kabul University was able to grow and revive in a new and modern way (Kabul University, 2018).

Kabul University, as the oldest and most esteemed institution of higher education in Afghanistan, holds a crucial role in the country's higher education system. A brief strengths, weaknesses, opportunities, and threats (SWOT) analysis reveals the following findings:

1. Strengths: Historical significance and reputation, a wide range of academic programs, experienced faculties, and a convenient location in the heart of the capital city.

2. Weaknesses: Infrastructure deficit resulting from prolonged conflict, restricted resources allocated for research, outdated curricula in certain departments, and challenges in both recruiting and maintaining highly qualified staff.

3. Opportunities: Potential for engaging in international collaborations, growing need for higher education in Afghanistan, increasing worldwide focus on

sustainability in higher education, and opportunity to take the lead in creating sustainable solutions that are relevant to the local context.

4. Threats: Political instability and security concerns, brain drain of academic professionals, competition from emerging, specialized institutions, and possible reduction in funding owing to economic challenges.

Kabul University is uniquely positioned to lead sustainability activities in Afghan higher education, regardless of encountering substantial challenges (Mussawy & Rossman, 2021). Kabul University's sustainability efforts are more extensive and firmly established compared to other prominent Afghan HEIs. Although Herat University and Nangarhar University have implemented certain sustainability initiatives, such as the construction of solar energy systems, Kabul University has adopted a more comprehensive and holistic approach. For example, Kabul University has incorporated sustainability principles into different academic programs and has developed a specialized faculty with three departments for the study of the environment. Nevertheless, Afghan universities face comparable problems when it comes to executing sustainability efforts, mostly because of limited resources and the country's post-conflict context (Hayward. F, 2015).

Being the oldest and most esteemed university in Afghanistan, Kabul University is a major player in the country's higher education system. It was founded in 1932 and has long led Afghanistan's intellectual conversation and advancement of academia (Kabul University, 2018).

Additionally, Kabul University faces difficulties with sustainability initiatives due to Afghanistan's post-conflict environment. Sustainable design principles can be incorporated into the university's ongoing efforts to rebuild and modernize its facilities (Ahmadi, 2022). Kabul University has a unique opportunity to lead in this area despite facing significant challenges in implementing sustainability initiatives due to its historical significance and central role in Afghan higher education. The university can significantly contribute to sustainability in Afghanistan's higher education sector and beyond by addressing its weaknesses and utilizing its strengths (Saqib & Toheedmal, 2023). The current organizational structure of Kabul University is discussed in the following subsection.

1.3.2 Current Organizational Structure of Kabul University

Regarding the institutional framework, the higher education establishment functions in adherence to the statutory provisions that regulate higher education. A university is formally led by an academic staff that is composed of a chancellor and three vice chancellors. The vice chancellors are responsible for the administration of academic affairs, student affairs among high-ranking professors, and administrative and financial affairs through a competitive civil service process. The so-called faculty is an academic entity that is formed within a university and is responsible for establishing at least two departments of the same field but with distinct specializations. The faculty provides higher education services to the students of the institution. Kabul University is by the Chancellor, who reports to the Ministry of Higher Education. The chancellor at a public university is appointed by the President of Afghanistan for a period of 5 years, and the position can be extended for an additional 3 years, and the dean of a faculty at a public university is recommended to the president and assigned accordingly (Azimi & Balakarzai, 2020). The Figure 1.3 indicate the 1.3.2 Current Organizational Structure of Kabul University.

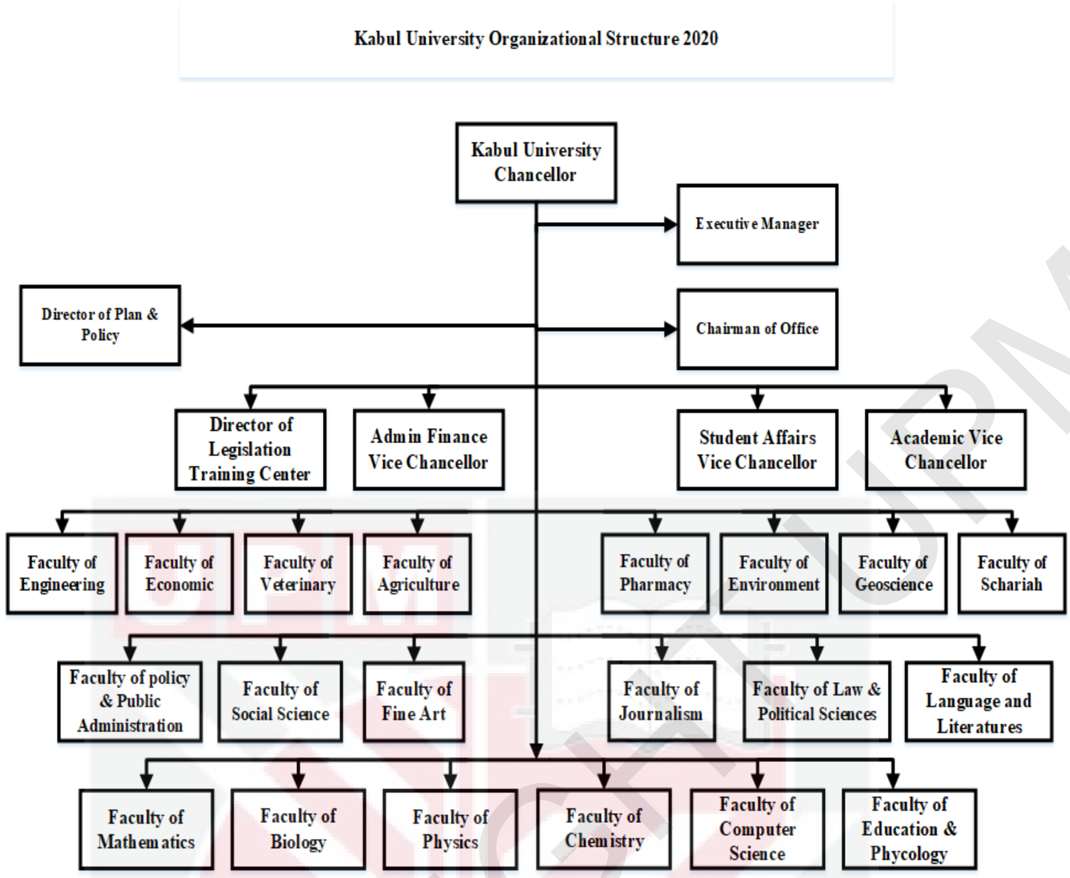

Figure 1.3 : Organizational structure of Kabul University in 2020

1.3.3 Academic Programs

Kabul University comprises by 20 faculties and 21 postgraduate programs under the Academic Vice Chancellor's leadership. These include divers disciplines such as Language and Literature, Economics, Engineering, Environment, Law and Political Science, Public Policy and Administration, Psychology, Agriculture, Geoscience, Journalism, Mathematics, Physics, Chemistry, Biology, Sharia, Social Science, Pharmacy, Computer Science, Fine Art, and Veterinary. Additionally, the Post-Graduate Management Center and the Research Center operate under the Academic Vice Chancellor's supervision.

The Legal Training Center provides practical services and training for the Afghanistan legal stockholders, especially to the Supreme Court and other related institutions autonomously.

1.3.4 Administration and Facilities

Kabul University provides some essential facilities to run its programs, which are operated by the Vice Chancellor of Administration and Finance Affairs. These include girl's dormitory, boy's dormitory and its hostel dining halls, health clinic, guest house, gymnasium, teaching complex and auditorium, publication center, library, kindergarten, archive center, mosque, and cafeteria. Moreover, there are other facilities that are operated by related stockholders' institutions, such as the Statistics Center at Kabul University, which is managed by the Department of Afghanistan Central Statistical Authority. However, the Afghanistan Center at Kabul University belongs to a non-profit organization that established a database and resource center about Afghanistan.

1.4 Problem Statement

Higher education institutions (HEIs) in poor countries face unique challenges when it comes to sustainability. However, there aren't many full studies that look at their environmental, economic, and social impacts comprehensively. This study fills in that gap by applying Organizational Life Cycle Sustainability Assessment (OLCSA) on Kabul University, which is one of the best universities in Afghanistan.

Despite growing recognition of sustainability in higher education around the world, the use of integrated sustainability assessments such as Organizational Life Cycle

Sustainability Assessment (OLCSA) remains largely unexplored in poor countries and post-conflict contexts such as Afghanistan. This gap is crucial because it inhibits HEIs' ability to implement data-driven strategies for environmental, social, and economic sustainability in areas where such improvements are urgently required. The absence of comprehensive sustainability evaluations in these contexts impedes the establishment of effective policies and practices that could help solve larger global issues like as climate change mitigation, resource conservation, and educational equity in post-conflict areas.

Addressing this research gap is important for several reasons such as; poor countries or Post-conflict sustainability: It will offer a perspective on the ways in which higher education institutions can contribute to sustainable development in regions that are recovering from conflict, where resources are constraint and environmental issues frequently take a backseat to immediate reconstruction requirements (Babury & Hayward, 2013).

Educational equity: Strategies to enhance access to quality education, particularly for marginalized groups, can be informed by an understanding of the sustainability performance of higher education institutions in poor countries and post-conflict settings, thereby contributing to SDG 4 (Quality Education) (Mussawy & Rossman, 2021).

Climate resilience: This research can contribute to the development of climate-resilient educational infrastructure by assessing the environmental impact of HEIs in resource limited environments, which is in accordance with SDG 13 (Climate Action) (Helmers et al., 2021).

Economic development: Assessing the economic dimension of sustainability in higher education institutions can provide valuable insights into their role in long-term development and post-conflict economic recovery, thereby supporting SDG 8 (Decent Work and Economic Growth) (Azimi & Balakarzai, 2020).

The primary research problem is to assess Kabul University's environmental impacts using O-LCA, with a focus on carbon emissions and resource consumption. Secondary goals include determining economic sustainability using Life Cycle Costing (LCC) and investigating social consequences using Social Organizational Life Cycle Assessment (SO-LCA). This hierarchical approach enables a full sustainability assessment while keeping a clear focus on environmental problems.

Higher education institutions (HEIs) in areas that have recently been through out a conflict need a full sustainability review more than ever. OLCSA has been used in many different situations, but its use in higher education institutions after a war has not been fully researched. This study fills in that gap by using OLCSA to look at Kabul University, which is a well-known college in Afghanistan's higher education system. This study adds to what is already known by using the OLCSA method to look at the unique problems that come up in higher education after a war. It does this by looking at things like limited data and resources (Mussawy & Rossman, 2021).

The higher education sector in Afghanistan has been profoundly affected by violence and migration. UNESCO (2021) reported that the gross enrollment ratio in postsecondary education in Afghanistan was at 9.7% in 2018, far lower than the global average of 38%. Additionally, the Internal Displacement Monitoring Centre (IDMC, 2023) indicated that around 1.2 million Afghans were internally displaced as a result of conflict and violence in 2019, likely hindering their access to higher education.

Furthermore, since the Taliban's takeover in August 2021, academic lecturers from Afghanistan have left in somewhat significant numbers. Many of the over 30% of university academics who have migrated from the country hold doctorates and master's degrees from foreign universities (Carleton University, 2024). However, many exiled lecturers have voiced unwillingness to return unless major reforms take place, especially with relation to girls education (The Frontier Post, 2023).

From 14.10% in 2022 to 15.40% in 2023 Afghanistan's general unemployment rate rose. Among Afghan women and young people, the rate was highest; 58% of women household members lacked job possibilities and 31% of young men and 57% of young women aged 14 to 24 years (UNHCR, 2023). Moreover, Afghanistan's higher education has had great difficulties recently. With 128 private higher education institutions registered with the Ministry of Higher Education as of 2021, 151,904 students—of which 28% were women were enrolled .

Furthermore, this situation poses a significant obstacle for universities that aim to achieve ambitious climate objectives and resolve their environmental impact comprehensively. To efficiently reduce the carbon footprint of a university campus, a comprehensive comprehension of emissions origins throughout the establishment's activities and supply chain is essential (Helmers et al., 2021). Research has indicated that the carbon emissions resulting from the production and usage of goods and materials can be higher than the combined carbon emissions from the day-to-day operations of certain university campuses (Clabeaux et al., 2020; Yañez et al., 2020).

This study also wants to address gap in the literature by looking at how sustainable colleges are in developing countries, poor countries, and especially those that have just come out war situation. By focusing on Kabul University, this study will show the special problems and chances that come up when trying to use sustainable practices in those kinds of settings.

It is not common to do an integrated review that carefully looks at the environmental, economic, and social impacts of higher education institutions in places where there has been conflict (Hayward, 2015). Earlier research has looked at how sustainability efforts relate to the broader aims of rebuilding and improving institutions in poor countries (Babury & Hayward, 2014). It is significance to look into how sustainability assessment can help with strategic planning and allocating resources in higher education systems (Azimi & Balakarzai, 2020).

Hayward (2015) argued that there is a lack of integrated assessment that thoroughly evaluates the environmental, economic, and social implications of a given situation. Babury and Hayward (2014) examined the relationship between sustainability initiatives and the broader goals of rebuilding and advancing institutions in a post-conflict setting. Azimi and Balakarzai (2020) explored how sustainability assessment can provide valuable information for strategic planning and resource allocation in higher education systems that are resource-constrained. Additionally, Lack of standardized tools to evaluate environmental, social, and economic dimensions comprehensively (Singh et al., 2023) and there is limited empirical evidence on HEIs' contributions to sustainability assessment (Abdullahi et al., 2024).

Universities are increasingly recognizing the value of O-LCA as a method for analyzing their total carbon footprint, which consists of embodied and operational emissions. This method has the capability to furnish the precise data required for the identification of carbon concentrations, the guidance of sustainable procurement practices, and the facilitation of supplier collaborations aimed at reducing emissions (Helmers et al., 2021; Yañez et al., 2020).

Kabul University is one of the largest universities in Afghanistan, and it is crucial to analyze the carbon footprint based on O-LCA to contribute to the sustainability assessment of an organization. Furthermore, higher education is one of the most critical services to produce human capital. The environment as a pillar of current notions of sustainability is an essential part of sustainability education. Therefore, the components affecting the environmental perception of students are important in designing sustainable communication and teaching methods (Ling et al., 2020).

The environmental impacts of Kabul University extended beyond its organizational boundaries, local ecosystem and community. Focusing on theses impacts utilizing O-LCA, this research will offer valuable information and insight policy makers and higher education ministry leadership to improve sustainability practices in Afghanistan higher education system.

A lack of finance is one of the greatest difficulties and red-line concerns for the viability of universities and other HEIs. The academic community has difficulties understanding the importance of adopting a sustainability model for the administration of colleges and universities. While infrastructure on university campuses lasts for a relatively long time, non-academic personnel have identified an extra barrier in older campus buildings. Self-awareness and the manner in which individuals think have a crucial effect on conservatism and resistance to change (Leal Filho et al., 2021).

Kabul University has impacts on the environment, the economy, and society that go beyond the university itself. Stakeholders, the community's economy, and the natural environment feel these impacts. Financial constraints has a direct impacts on the long-term survival of these potential services. Also, there is a notable gap in the literature regarding the life cycle costing (LCC) of higher education institutions, especially in poor countries (Kambanou, 2020; Xue et al., 2020).

Therefore, universities must prioritize the resolution of this issue in order to uphold their fiduciary obligations, improve their financial and operational performance, and make a positive contribution to wider sustainability initiatives (Kambanou, 2020). The advancement of campus-focused LCC research and practice should be a top priority for both academics and university administration (Kambanou, 2020; Xue et al., 2020).

Therefore, based on the existing literature, no studies have been identified that comprehensively assess higher education in all its aspects, including facilities and services. Furthermore, there is a notable gap in the literature regarding the LCC of HEIs. No studies have been found that calculate the LCC for higher educational facilities and services. There is a need to conduct a higher education LCC study to calculate all facilities and services considering the environment. The lack of LCC study in higher education is worrying, primarily because it designates the cost of higher education. This study will have implications and usefulness in the body of the knowledge, where the study will develop a framework for cost data calculation in all aspects of education LCC and its contribution to the OLCSA of an HEI. It will hint for all organizations to calculate all facilities and services to assess their organization's LCC based on the context. Moreover, it will assess and analyze all dimensions of sustainability in the organization. Subsequently, the less contributed dimension of sustainability will be improved based on policies, and new policies will be established for improvements in Afghanistan, particularly in the Ministry of Higher Education. The Ministry of Higher Education will be recommended to push their universities and HEIs toward sustainability.

This study will develop a framework for evaluating and improving academic institutions' sustainability. This framework could be used in similar situations around the world especially in poor countries. Kabul University can be an example for other universities in the region by fixing its flaws and working toward the UN's Sustainable Development Goals, especially SDG 4 (Quality Education) and SDG 11 (Sustainable Cities and Communities).

The social issues and social performance of an organization are crucial for all stakeholders to be satisfied with their services and products. Therefore, some studies underscore the presence of racial, gender, and socio-economic disparities experienced by both academic and non-academic personnel in university settings (Kalim et al., 2022; Laar, 2019). Social organizational life cycle assessment is a relatively new concept, and both data availability and methods are in a constant state of evolution. However here is no consensus on suitable social indicators for HEIs (Chabrawi et al., 2023).

An additional obstacle in the analysis would be the attempt to pinpoint the precise geographical location of impacts. Moreover, the expansion of the theoretical corpus pertaining to the notion of social debt presents an additional obstacle for forthcoming investigations. By indicating which SDGs have the greatest potential impact, SO-LCA can serve as a valuable internal social management instrument for organizations, facilitating decision-making in accordance with the SDG framework (Erauskin-Tolosa et al., 2021). Factors such as an overwhelming amount of work, extended periods of employment, and uncertainty about job stability contribute to increased levels of stress and burnout among academics (Dlamini et al., 2024).

By concentrating on Kabul University, a well-known establishment in a post-conflict environment, this study seeks to close this gap by analyzing its particular sustainability opportunities and challenges. In addition, this study intends to close the knowledge gap regarding organizational sustainability in higher education, specifically in developing and post-conflict settings, by concentrating on Kabul University. It will add to the theory and practice of sustainability in higher education by offering insightful information about how to incorporate sustainability into the reconstruction and modernization efforts of universities that have experienced conflict. Moreover, unique challenges like instability and resource constraints in HEIs in post-conflict areas is significantly crucial and need to be studied (Kester et al., 2022; Milton, 2021)

A further LCSA study is needed, and this exploration will be significantly beneficial for analyzing the environmental, social, and economic dimensions of sustainability; furthermore, this method could be a useful indicator to support different capacity-building and literary programs (Collotta et al., 2019). Moreover, no studies have been conducted in the education process to analyze the O-LCA, SO-LCA, and LCC of higher education and to integrate them into sustainability. There is a need to analyze the O-LCA, SO-LCA, and LCC of education programs, especially higher education, and to combine them with sustainability.

1.5 Research Objectives

The aim of this research is to evaluate the sustainability of Kabul University as an organization of the higher education system in Afghanistan. This objective study needs to assess the O-LCA, LCC, and SO-LCA and integrate these assessments into a sustainability model. The specific objectives of this research are:

1. To evaluate the environmental impacts of higher education operation and services in Kabul University based on organizational life cycle assessment.
2. To evaluate the cost of higher education facilities and operation in Kabul University using life cycle costing.
3. To analyze the social performance of Kabul University considering social organizational life cycle assessment based on UNEP 2020 guidelines.
4. To visualize the organizational life cycle sustainability assessment in Kabul University based on the integration of organizational life cycle assessment, life cycle costing, and social organizational life cycle assessment.

However, this study aims to systematically address several key research gaps in the field of sustainability assessment for higher education institutions in poor countrie.

This research provides a comprehensive sustainability assessment by integrating the environmental (O-LCA), economic (LCC), and social (SO-LCA) dimensions, in difference to previous studies that have examined individual aspects of sustainability in higher education (Babury & Hayward, 2014; Mussawy & Rossman, 2021). This addresses the gap that Hayward (2015) identified in poor countries higher education settings with respect to the absence of integrated assessments.

1.6 Research Questions

The research questions of this study are directly aligned with the objectives and focus on assessing the sustainability of Kabul University as an organization. The following questions have been refined to guide the research process:

1. How can O-LCA be effectively applied to assess environmental impacts in an Afghan university context?
2. How much is the cost of the higher education service of Kabul University during the whole life cycle of the study program, considering the unique economic challenges of Afghanistan's post-conflict environment?
3. What is the social sustainability performance of Kabul University according to the SO-LCA based on the UNEP 2020 guidelines, and how do these reflect the local context?
4. How can the integration of O-LCA, LCC, and SO-LCA results be effectively visualized and analyzed using the sustainability triangle to identify weaknesses and guide improvements in Kabul University's sustainability performance in the context of Afghanistan's higher education system?

1.7 Significance of the Study

This study is vital for Kabul University because it analyzes organizational sustainability, which estimates the gap and strength in the sustainability dimensions at Kabul University. This study recommends the improvement of the poor contribution of dimensions in the sustainability of an organization. This study develops an example of OLCSA specifically for HEIs, which can be adapted for other organizations based on their unique contexts. Furthermore, this study holds enormous significance for Kabul University and the wider domain of higher education in post-conflict environments for various reasons. This study enhances the comprehension of organizational sustainability in higher education, specifically in developing and post-conflict nations like Afghanistan, both in theory and practice. The study emphasizes the distinct sustainability challenges and opportunities encountered by HEIs in situations like Kabul University.

According to theoretical contributions, this study expands upon the theory of OLCSA by demonstrating its application in settings that have limited resources post-conflict. It contributes to the existing body of literature by applying the OLCSA methodology to the unique challenges of HEIs in developing countries, and these obstacles include limited access to data and constraints on resources (Mussawy & Rossman, 2021).

Findler et al. (2019) the enhancement of the comprehension of sustainability in higher education settings by incorporating the environmental, economic, and social dimensions of sustainability into a holistic assessment framework. Babury and Hayward (2014) analyzed the relationship between sustainability initiatives and the broader objectives of rebuilding and developing institutions in post-conflict settings.

The O-LCA of Kabul University highlights the higher education sustainability issues in Afghanistan, especially at Kabul University. This study analyzes the environmental input and output of resources and impact assessment of the whole education process and recommends a suitable solution for environmental impacts generated by HEIs.

Economically, the sustainability issues in a university or institution of higher education due to lack of funding are a red-line concern for universities. Leal Filho et al. (2021) agreed that the academic community has difficulties perceiving the relevance of adopting a model of sustainability for the management of HEIs/universities, and highlighted and audited the value of sustainable practices. Furthermore, a university encounters a double challenge with regard to complex finance management. Firstly, the budget is restricted and, as there are no financial resources, the execution of most operations requires some financial assistance. Secondly, the price differential is determined by the market, with ecological goods prices substantially higher than non-ecological ones for use in construction, maintenance, and operation. As the university campus infrastructure lasts relatively long, non-academic employees indicated an additional obstacle to older campus buildings.

In terms of the practical implications for stakeholders, this study offers practical insights for the administration of Kabul University to improve sustainable practices. The resource provides methods for reducing environmental effects, maximizing life cycle expenses, and enhancing social sustainability. Furthermore, the findings provide guidance to policymakers in Afghanistan and other post-conflict countries on how to integrate sustainability into their higher education programs. The paradigm outlined by Hayward (2015) offers a precise and straightforward approach to adopting sustainable practices in situations with limited resources. Moreover, according to the students, the study aimed to enhance students' experience and engagement in sustainability activities at Kabul University by assessing the social impacts and social performance of the university by considering stakeholders' expectations (Lozano et al., 2015). Moreover, according to faculty and non-faculty staff, an exhaustive assessment of organizational sustainability can provide insights toward improving working conditions, job satisfaction, and professional development chances for university staff (Mussawy & Rossman, 2021).

In terms of stakeholders' satisfaction, the SO-LCA has been adopted accordingly by analyzing the social implications and indicators among the students, academic staff, and non-academic staff of Kabul University. The expectations of all stakeholders have been analyzed and their concerns are highlighted, and the findings contribute to the improvement of the social aspect for HEIs as an organization to fulfill all expectations of their stakeholders as service provider institutions based on the UNEP standards.

Overall, the findings of this research will contribute to SDGs and will be committed by Kabul University to contribute to SDGs 2030. Argento et al. (2020) stated that universities and stakeholders play a crucial role in shaping the sustainable development agenda. There is an increasing demand for HEIs or universities to take an active role in addressing societal challenges, which are extremely significant in sustainability. As a consequence, HEIs and universities are generating knowledge organizations of sustainable development, which places them as drivers of economic development (Leal Filho et al., 2021). Kabul University, like other higher education institutions (HEIs), aligns with UN SDGs, including SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Production and Consumption), and SDG 13 (Climate Action). These aspects are evaluated in the OLCSA study, and the findings will contribute to the above-mentioned SDGs. The goal of SDG 4 is to deliver equitable and high-quality education, and HEIs/universities are also recognized as the main actors in accomplishing SDGs. Furthermore, institutions of higher education and universities are reorienting institutions' practices and policies in the pursuit of education that allows the existing generation to dedicate itself to a sustainable and supportable life (Menon & Suresh, 2021). Additionally, the Afghanistan Constitution orders equitable and quality education, as well as free-of-charge education to students until the undergraduate level for all faculties. Furthermore, HEIs should decide under the sustainability paradigm to generate knowledge more collaboratively by initiating dialogs across society with other key actors, which also reflect universities and as examples of sustainability in society (Müller-Christ et al., 2014).

In order for an HEI to achieve sustainability, it must identify the root of the problem. With the environmental, economic, and social demands on sustainability, possibilities are emerging for various societal players and organizations to advance more sustainable practices in new ways. Higher education institutions, particularly universities, occupy a unique position in society, as they have the potential to promote and encourage societal responses to sustainability challenges confronting communities around the world through the interactions of thousands of individuals on campus and the dissemination of information to millions. Thus, universities encourage sustainability on campus by re-evaluating their missions; reorganizing their research programs, curriculum, and campus lifestyle; and strengthening their transdisciplinary collaborations with other societal institutions (Waheed et al., 2011). Consequently, by analyzing the O-LCA, SO-LCA, and LCC for Kabul University and consolidating them all to sustainability, this study will contribute to the OLCSA of higher education's facilities and services at Kabul University. In addition, O-LCA, SO-LCA, and LCC studies will be combined to estimate the OLCSA sustainability of the education process and services at Kabul University and finally to improve the pillar contribution to sustainability.

Finally, this study aims to advance organizational sustainability models by developing and implementing an integrated OLCSA model. The OLCSA model combines three key components of O-LCA, LCC, and SO-LCA. This all-encompassing model can function as a conceptual foundation for future investigations on sustainability in HEIs, specifically in demanding circumstances. Moreover, the study offers context-specific insights into the sustainability problems faced by HEIs in post-conflict situations, with a particular focus on Kabul University. This study adds to the existing body of research on sustainability in higher education by emphasizing the influence of conflict and resource limitations on sustainability initiatives. Additionally, the study is in line with multiple SDGs, specifically SDG 4 (Quality Education), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). It offers a structure for HEIs to contribute to these objectives by implementing sustainable practices.

The findings of this study have implications that extend beyond Afghanistan, providing valuable understanding for the development of sustainability policies and practices in higher education on a global scale. By demonstrating the implementation of OLCSA in a demanding context, it imparts significant insights for modifying sustainability assessment methods to suit a wide range of institutional and cultural settings, particularly for integrating sustainability into the process of reconstructing and developing institutions in post-conflict contexts or with limited resources.

In terms of practical contributions for university administrators, the findings provide practical suggestions for Kabul University administrators to enhance sustainable practices. This encompasses tactics for mitigating environmental effects, maximizing the economic efficiency of the entire lifespan, and improving societal sustainability. Regarding policy implications, the study provides useful insights that can inform the decisions of policymakers in Afghanistan and other countries that have experienced conflict and are in the process of rebuilding. The text emphasizes the significance of incorporating sustainability into higher education policies and offers a well-defined approach for achieving this goal. The study examines the social effects of Kabul University and considers the expectations and concerns of different stakeholders, such as students, academic staff, non-academic workers, and the wider society. Implementing this strategy can enhance the university's ability to enhance stakeholders' satisfaction and foster greater participation. Finally, the study's comprehensive approach can be used as a model for other HEIs in Afghanistan and similar settings. It recognizes exemplary methods and identifies areas that need enhancement, offering a clear plan for other organizations to emulate.

1.8 Scope of the Study

The scope of this study is set by considering at how sustainable Kabul University in Afghanistan is. The Organizational Life Cycle Sustainability Assessment (OLCSA) framework is used for the assessment. This framework takes into account economic, social, and environmental aspects. The following important factors are at the heart of this evaluation.

To look at the environmental impacts Organizational Life Cycle Assessment (O-LCA) scope, a gate-to-gate system boundary is used for the study, which covers activities on the main campus of Kabul University. This includes buildings, infrastructure, and actions that are directly managed. However, A functional unit is one student who finishes a four to six-year undergraduate study. The assessment is mainly about the following types of impacts like the amount of energy used (fuel, electricity) (Use of Water) (Generation of Waste), and the Carbon Emissions (from using energy and driving). The results for the study will be gathered between 2020 and 2021.

Assessing the economic scope life cycle costing (LCC) Throughout its organizational life cycle, the study analyzes the environmental implications linked to Afghanistan's higher education process and system, which encompasses examining the environmental impacts of constructing and operating higher education facilities of universities or HEIs. This could include issues like energy use, water consumption, and waste generation. In this study, the environmental impact of routine operations in higher education, including power use in lecture halls and laboratories, transportation of staff and students, and waste generation, was analyzed.

The primary objective of the research is to evaluate the sustainability performance of Kabul University by adopting internationally recognized indicators. This encompasses the assessment of environmental impacts through Organizational Life Cycle Assessment (O-LCA), with an emphasis on resource consumption and carbon emissions. The study will analyze these impacts by utilizing metrics such as energy use intensity (kWh/m2) and total carbon footprint (in CO2 equivalent), considering the ReCipe 2016 method in Simapro. Life Cycle Costing (LCC) will be employed to evaluate economic sustainability, with an emphasis on indicators such as the return on investment in sustainability initiatives and the operational costs per student. The Social Organizational Life Cycle Assessment (SO-LCA) will be employed to investigate the social impacts, with an emphasis on metrics such as student satisfaction rates and staff retention using united nation defined indicators in the UNEP 2020 guideline.

the study employs University financial records, and costs are classified as capital and operational for the year 2020. The following cost elements will be considered: Construction and Renovation Costs, Utility Costs (electricity, water, and gas). Maintenance and repair (buildings and equipment), Salaries and Wages, and all operation costs.

In this study, the service provides the costs calculated based on the cost inventory data for the year 2020. All costs were categorized into two domains: the construction, building, and property costs, and the operation costs. The property costs and building costs were calculated under the domain of construction, building, and property costs domain, whereas the maintenance costs and service and utility costs were calculated under the domain of operation costs. For the scope of the LCA study, the components of maintenance costs were divided into maintenance, replacement, and renovation, while the components of service and utility costs were divided into energy, water, electricity, oil and gas, waste, post and communication, salary, laboratory cost, transportation, and hostel costs.

However, standardizing the LCC study the LCC Parameters were applied such as: Cost categories include operational costs (such as salaries, utilities, and maintenance) and construction and property costs. Time horizon: Standard Undergraduate programs typically last between four and six years. Discount percentage: To be determined in accordance with the most recent economic indicators in Afghanistan. Data sources include financial records from universities and Ministry of higher education. However, the LCC estimate follow the framework established by Swarr et al. (2011), which consider both direct and indirect costs associated with Kabul University operational activities.

Using the UNEP (2020) Guidelines for Social Organizational Life Cycle Assessment, the study focused on how satisfied important stakeholders are with Kabul University in terms of social issues. Some of the most important things that the scope should address are the workers, which include the academic and administrative staff, and the consumers (students), who received the services of Kabul University. Moreover, some important indicators where consider for worker category such as job satisfaction, fare salary, discrimination, health and safety, social benefits, employment relationship, and sexual harassment. Furthermore, safety, feedback mechanism, consumer privacy, transparency, and end-of-life responsibility indicators were used for the consumer category social performance assessment.

In order to evaluate the social sustainability of Kabul University, the SO-LCA will analyze two stakeholder categories: workers (academic and administrative staff) and consumers (students). It will concentrate on each category sub indicators defined in UNEP 2020 guideline. Data will be acquired through surveys and interviews with stakeholders by validated survey questionnaires. The methodology will be customized to the unique context of Kabul University in order to insure accuracy and relevance, in accordance with the UNEP/SETAC Guidelines for Social Life Cycle Assessment of Products and Organizations (UNEP, 2020).

Based on the boundaries, the study is restricted to the main Kabul campus of Kabul University geographically. The designated limit of Kabul University is based on other HEIs in the nation acting as models. This study examined only the data for the 2020 academic year, especially for LCC. Regarding social and environmental considerations, the usual 4–6 year undergraduate degree cycle is considered. Furthermore, the study employs the gate-to-gate methodology, focusing on students who are admitted to Kabul University based on their performance in the national entry test.

The rationale for carrying out inclusions and exclusions is based on the fact that the research focuses mainly on undergraduate programs, which have a substantial impact on Kabul University's educational productivity. Nevertheless, in order to maintain a reasonable focus and work within the constraints of available data, activities such as high school education and the implications following graduation are not taken into account. Hence, the assessment focuses solely on the immediate activities of the institution and does not take into account the broader impacts on the supply chain, such as the manufacturing of educational materials. This is because there is a lack of available data in the Afghan context.

Robust data acquisition methods have been implemented to substantiate the validity and significance of this research. This encompasses the execution of a thorough carbon inventory in accordance carbon footprint and green house gas emissions. Detailed financial audits and reports will be implemented to accumulate economic data. Surveys and interviews with important stakeholders, such as students, staff, and community members, will be implemented to accumulate social data. This multifaceted data collection approach will establish a robust foundation for the sustainability assessment and guarantee the practical relevance and impact of the research by insuring the validated data.

This study utilized a comprehensive Organizational Life Cycle Sustainability Assessment (OLCSA) framework that comprises three critical components: Social Organizational Life Cycle Assessment (SO-LCA), Life Cycle Costing (LCC), and Organizational Life Cycle Assessment (O-LCA). Sustainability parameters that are particular to each pillar are addressed and applied the O-LCA Parameters for the O-LCA study, which analyzed environmental impacts using the ReCiPe 2016 method and SimaPro software, considering ISO 14040 and 14044, applying by ISO/TS14072 standards (Huijbregts et al., 2017).

Finally, a schematic diagram illustrating the extent of the study is included in this setting, depicting the boundaries of the system, the flow of inputs, processes, and outputs, as well as the three assessment components (O-LCA, LCC, and SO-LCA) within the context of Kabul University. This scope enables a more comprehensive and clear evaluation of the sustainability of Kabul University's operations.

Although these boundaries and exclusions limit the scope of the study, they allow for a focused and feasible assessment given the unique challenges of conducting research in a post-conflict setting. Future studies may expand upon this foundation as data availability and research capacity in Afghanistan improve.

1.9 Delimitations of the Study

This study on the OLCSA of Kabul University has several key delimitations. These boundaries were carefully selected to ensure the feasibility and focus of the research while recognizing their potential impacts on the findings and generalizability of the results. Among the delimitations of the study are:

1. Focus on a single institution: This is based on the delimitation of this study that exclusively focused on Kabul University. Kabul University, being the oldest and largest university in Afghanistan, is a good example of higher education in the country. The potential impact of this emphasis enables a thorough assessment, although it may restrict the applicability of the results to other institutions that possess distinct traits or contexts.

2. Timeframe of the study: The delimitation of the timeframe of the study is that the study used data from the 2020 academic year. Nonetheless, this timeframe provides the most recent comprehensive data available at Kabul University. Based on the potential impact of this delimitation, the focus on a single

academic year may overlook long-term trends or changes in sustainability performance (Findler et al., 2019).

3. Environmental assessment delimitation: The study largely focused on carbon dioxide (CO_2) emissions in its environmental evaluation. CO_2 is an important measure of the environmental impacts, and there is insufficient information available on other greenhouse gases (GHGs) in the Afghan context. Therefore, the potential impact of the delimitation emphasis may fail to fully account for the whole scope of environmental impact, especially those associated with more GHGs or nearby contaminants (Helmers et al., 2021).

4. Stakeholders focusing on social assessment: The delimitation of the social assessment specifically targets workers (both academic and administrative staff) and customers (students), while ignoring other actors in the value chain. However, these stakeholders have the greatest direct involvement and are impacted the most by the university operations than other stakeholders. The potential impact of this delineation may fail to consider the larger social impacts inside the supply chain or the broader community (Erauskin-Tolosa et al., 2021).

5. Economic assessment boundaries: These refer to the delimitation or scope within which an economic assessment is conducted. The delimitation is that the LCC specifically targets the direct and explicitly stated costs incurred by the university. This method offers a precise assessment of the university's ability to maintain its financial sustainability given its limited financial resources. Therefore, the potential impact will be that the university's indirect economic impacts or broader economic contribution to society may not be adequately accounted for (Kambanou, 2020).

Future research could extend these boundaries to provide a more comprehensive understanding of sustainability in the context of higher education in Afghanistan. There is a delimitation in all three dimensions of sustainability (environmental, economic, and social).

When determining the scope of O-LCA investigations in higher education organizations, certain important factors are considered. This study mostly used the calculation of CO_2 gas for GHG assessment of carbon footprint because the activities involved in the HEIs in Afghanistan, especially Kabul University, are studied under the carbon footprint, and other gases are not considered to be analyzed in this study. Although this method offers a comprehensive evaluation of CO_2 emissions, it is important to recognize that by not considering other GHGs and upstream effects, the overall environmental impact may be underestimated. The need to establish this boundary is imperative due to limitations in available data specific to Afghanistan and the intricate nature of conducting a comprehensive analysis of GHG emissions.

The SO-LCA in HEIs focuses on evaluating the social consequences of academic activity. The purpose of this assessment is to identify areas of high activity, minimize the negative impact socially, and increase knowledge and understanding among the academic community to improve the social satisfaction level among all stakeholders. This assessment evaluates the social effects on many stakeholders, including employees, local communities, and society as a whole. Additionally, the methodology integrates S-LCA and O-LCA to offer a holistic perspective on the social impact of an organization.

Consequently, the analysis takes into account the two stakeholders based on the UNEP (2020) guidelines: the worker category, which includes academic and administrative staff, and the consumer category, comprising students who received services from Kabul University. The value chain actor category is not analyzed in this study due to the complex relationship of Kabul University with the value chain actor's institution and also due to security situation, data insecurity, and lack of institutional cooperation. Nevertheless, directing the attention toward internal stakeholders, namely the workers and students, allows us to gain significant insights into the immediate social performance and context of Kabul University, which is highly pertinent to the research objective.

The delineation of LCC in educational institutions entails numerous obstacles and factors to be considered. The hurdles encompassed in this context consist of restricted acceptance in design methodologies, complications in execution, legal hindrances, and constraints on assessment techniques. Furthermore, financial constraints directly affect the long-term viability of these crucial services. Additionally, the emphasis on stated costs offers a unique perspective of the university's fiscal viability but may overlook wider economic contributions and implicit expenses. This constraint is recognized, and future investigations could broaden the economic examination to encompass these facets.

1.10 Operational Definition

In order to guarantee simplicity and uniformity in this thesis, the subsequent table presents precise definitions for pivotal terminology pertaining to OLCSA and the Afghan higher education context.

Table 1.1 : Key definition in the context of the OLCSA study of Afghan higher education Institution

Term	Definition	Reference
Organizational Life Cycle Sustainability Assessment (OLCSA)	An integrated methodology that incorporates environmental, economic, and social assessments to assess the sustainability of an organization across its whole lifespan	(Martínez-Blanco et al., 2015)
Afghanistan's Higher Education Institutions	Afghan tertiary educational institutions, encompassing universities and HEIs, functioning under the jurisdiction of the Ministry of Higher Education	(Babury & Hayward, 2014)
Sustainability in Afghanistan Higher Education	Afghan universities are being encouraged to include environmental, economic, and social factors in their operations, curriculum, and research in order to ensure long-term sustainability and beneficial outcomes	(Mussawy & Rossman, 2021)
Post-conflict Higher Education	Higher education institutions in a post-conflict country encounter distinct challenges, including the need to reconstruct infrastructure, enhance capabilities, and promote social reconciliation	(Hayward, 2015)
Organizational Boundary	The scope of facilities, activities, and operations included in the sustainability assessment of universities or HEIs	(UNEP/SETAC, 2015)

These definitions establish a fundamental basis for comprehending the basic ideas and framework of this research. The principles will be constantly employed throughout the thesis to guarantee clarity and precision in presenting the sustainability assessment of Kabul University.

1.10.1 Life Cycle Assessment

In the introduction to the International Standard ISO 14040, which serves as a framework, LCA can be defined as a study of the environmental aspects and potential impacts throughout a product's life (i.e., cradle-to-grave) from raw material acquisition through production, use, and disposal. The general categories of environmental impacts needing consideration include resource use, human health, and ecological consequences. A similar definition of LCA was adopted as early as 1993 by the SETAC in the Code of Practice document (Consoli et al., 1993).

Life cycle assessment has various definitions in different environments, but as stated or defined in ISO 14040, LCA is considered as a framework for studying the environmental features and possible impacts through a product's life, which include raw materials, production, as well as use and disposal. In fact, human health, usage of resources, and ecological consequences are directly or indirectly experiencing environmental impacts that need serious consideration. In 1993 the definition of LCA was also adopted by the SETAC in the Code of Practice document (Consoli et al., 1993).

1.10.1.1 Goal and Scope Definition

The goal and scope definition in LCA is the objectives of the assessment and showing the limitations of the system that need to be analyzed. The objective of the LCA determines the purpose it is being executed, and the extent specifies the elements that should be included and excluded from the investigation (Curran, 2017; Rosenbaum, 2017).

This phase of the investigation is vital, which establishes or paves the groundwork for all processes of the entire assessment, including the determination for the data collection, analysis, and interpretation of the collected data. The goal and scope definition in the LCA is a crucial step, which establishes and defines the objectives and limitations of the assessment. This also ensures that the methodical evaluation of the environmental consequences is linked to a product or system (Curran, 2017).

1.10.1.2 Life Cycle Impact Assessment

Life cycle impact assessment (LCIA) is a specific stage of LCA that aims to assess the possible environmental consequences arising from the used resources and waste generated by a product system across its complete life cycle. This encompasses the evaluation of the effects stemming from the extraction of raw materials all the way to the ultimate disposal of the product, also known as "cradle-to-grave" analysis (Nieuwlaar, 2013).

1.10.1.3 Life Cycle Inventory

Life cycle inventory (LCI) in an LCA study involves the measurement and quantification of the raw materials and energy used; furthermore, the LCI in the LCA also includes emissions to the atmosphere, land, and water; resource usage; and other releases across the whole life cycle of a product or process (ISO, 2006). The LCI is commonly recorded using the step-by-step procedures specified in ISO 14044 (Ferrari et al., 2021). These processes involve preparing data collection based on the defined purpose and scope, collecting the necessary data, validating the collected data, allocating the data appropriately, linking the data to the specific unit process, and finally aggregating the data (Fang et al., 2024). The LCI data are generally gathered for all operations encompassed by the system boundaries, including those from the supply chain. The collected data must pertain to the functional unit and align with the purpose and scope of the study, as well as the iterative nature of the LCA stages. An LCI produces a comprehensive inventory of basic flows derived from all processes within the analyzed product systems (Ferrari et al., 2021; Hischier et al., 2014).

1.10.1.4 Interpretation

The results or findings of the impact assessment are then interpreted and used to identify areas where improvements can be made to reduce the organization's environmental impact (Chhipi-Shrestha et al., 2015).

1.10.1.5 System Boundaries

System boundaries in a life cycle study are the parameters that determine which unit processes, inputs, outputs, and impacts are included in an LCA project (Ekvall & Weidema, 2004). The boundaries of the study define the spatial, chronological, and functional characteristics that affect the collection, analysis, and interpretation of data on environmental consequences related to a product, service, or process throughout its life cycle (Suh et al., 2004; Tillman et al., 1994). The study establishes clear boundaries to determine which actions are included in the system being analyzed and which activities are not included (Tillman et al., 1994).

1.10.1.6 Life Cycle Sustainability Assessment

The three fundamental components of sustainability, namely the environment, economy, and society, are commonly evaluated using the LCSA technique. Hence, the LCSA investigation is vital, encompassing the integration of LCA, S-LCA, and LCC (Chang et al., 2012; Omran et al., 2021).

1.10.1.7 Social Life Cycle Assessment

Social life cycle assessment is a systematic approach employed to assess the social and socio-economic dimensions of products, as well as their potential beneficial and detrimental effects across their complete life cycle. Moreover, S-LCA attempts to supplement the environmental focus of a standard LCA by considering the social implications on diverse stakeholder groups. These groups usually comprise workers, consumers, local communities, society, and value chain actors (Traverso et al., 2021). The UNEP Guidelines for Social Life Cycle Assessment of Products present a systematic method for creating inventories of social indicators, which are connected to effect categories associated with the primary stakeholder groups (Traverso et al., 2021; UNEP/SETAC, 2009, 2013; UNEP, 2020)

1.10.1.8 Life Cycle Costing

Life cycle costing involves conducting an analysis of the whole LCC of a product or process. In addition, LCC calculates the expenses for all phases, encompassing risk, investment, operation, maintenance, and demolition. Ultimately, LCC provides valuable information regarding the overall expenses associated with a product or process across its entire lifespan, aiding in the decision-making process (Miah et al., 2017).

1.10.1.9 Midpoint Impact Categories

The midpoint impact categories refer to a collection of environmental impact categories utilized for the purpose of categorizing and measuring the environmental effects of an organization's action. The categories are established in accordance with the ISO 14040 standard and are determined by considering the paths via which impacts occur and the potential for environmental harm (UNEP/SETAC, 2009, 2013; UNEP, 2020).

1.10.1.10 Decision-Making

Decision-making in an organization entails the systematic evaluation of collected data by examining available options, comparing them based on collected data, such as metrics, and making a choice that will most effectively meet to accomplish organizational goals and objectives. The success of the company in obtaining its goals or objectives relies heavily on this process, which can be impacted by several elements, such as the organization's culture, structure, and leadership style (Fulop et al., 1999; Kozioł-Nadolna & Beyer, 2021).

1.10.1.11 Organization

An organization, according to ISO/TS 14072 (2014), is defined as “a group of people who have their own functions with the organizational responsibility, relationships, authority, and teamwork needed to achieve the group's objectives.”

1.10.1.12 Organizational Life Cycle Assessment

According to ISO/TS 14072 (2014), O-LCA is “a compilation and evaluation of the inputs, outputs, and potential environmental impacts of the activities associated with the organization as a whole or portion thereof adopting a life cycle perspective.” The object studied in OLCA is the organization. The organization's portfolio usually includes more than one product; thus, the entire set of goods and services provided by the organization is assessed simultaneously (UNEP/SETAC, 2015).

1.10.1.13 Social Organizational Life Cycle Assessment

Based on the definition of UNEP (2020), SO-LCA is defined as "a compilation and evaluation of the social and socio-economic aspects and the positive and negative impacts of the activities associated with the organization as a whole or a portion thereof adopting a life cycle perspective."

1.10.1.14 Reporting Unit

Based on ISO/TS 14072 (2014), the reporting unit is "a quantified performance expression of the organization under study to be used as a reference."

1.10.1.15 Reporting Organization

According to ISO/TS 14072 (2014), an O-LCA study defines the reporting organization as the entity being assessed in the study. It entails defining the limits, operations, and procedures of the organization that are being assessed for their environmental effects. The reporting organization plays a vital role in O-LCA by establishing the framework for gathering, analyzing, and reporting environmental performance data within a defined timeframe (Marx et al., 2020).

1.10.1.16 Reporting Flow

The reporting flow quantifies the results produced by the reporting organization. It is a numerical value and serves as the foundation for completing the inventory of O-LCA. The reporting flow connects various units in the value chain to the portfolio of the reporting organization (UNEP/SETAC, 2015).

1.10.1.17 Carbon Footprint

A carbon footprint is a quantification of the environmental impact caused by human actions, particularly in relation to climate change. The measurement counts the quantity of GHGs, specifically CO_2, released into the atmosphere due to different activities, such as the combustion of fossil fuels for electricity, heating, and transportation, as well as the manufacturing of commodities and food (Guerrero-Lucendo et al., 2022; Koide et al., 2021).

1.10.1.18 Water Footprint

A water footprint is the combined amount of freshwater utilized both directly and indirectly by an individual, community, business, or in the production of a product or service. This measures the volume of water that is used and/or contaminated over a specific period of time in proportion to usage. The water footprint can be quantified for different entities, such as products, companies, river basins, countries, and even on a global scale (Konar & Marston, 2020).

1.11 Thesis Structure

This thesis attempts to comprehensively investigate the sustainability performance of HEIs, with a specific emphasis on Kabul University. The thesis is structured in a way that allows for a logical progression of each chapter, ensuring a thorough comprehension of the study subject, techniques, and findings. An overview of the organization is provided and the role of each chapter is elucidated in addressing the research inquiries and goals.

Chapter 1 presents a general introduction, which details the problem statement, objectives, research questions, the expected value of this study, and the research structure. The chapter describes the background of the higher education system in Afghanistan and focuses on Kabul University, which includes the importance of the higher education system, its activities, as well as its organizational sustainability. The contribution of this chapter establishes the foundation for the entire thesis by providing an overview of the background of the higher education system in Afghanistan, specifically emphasizing Kabul University. It emphasizes the significance of the higher education system, including its procedures, operations, and long-term viability.

Chapter 2 introduces the theoretical development of sustainability concepts in organizations, followed by the three pillars of sustainability assessment and their relationship to HEIs. The organizational life cycle-based assessment methods are discussed for assessing the sustainability of Kabul University. This chapter offers a theoretical basis that helps situate the research within the context of existing literature and theories. This section lays the foundation for the sustainability evaluations carried out in subsequent chapters, specifically addressing the research topics pertaining to the theoretical foundations of sustainability in higher education.

Chapter 3 discusses the methodology and research design of how this study is conducted. The chapter starts with an overview of the developed OLCSA method, followed by an explanation of the tools that are used in the sustainability assessment. Furthermore, the chapter's significance is in its delineation of the study approach and techniques, which guarantees transparency and replicability. This chapter is essential for comprehending the process of data collection and analysis, as well as for resolving the research issues pertaining to the methodological framework of the study.

For Chapter 4, this research focuses on the organizational sustainability of higher education, specifically examining Kabul University. This chapter analyzes the environmental, economic, and social impacts related to a university as an organization. This is followed by the discussion and analysis of the OLCSA and the presentation of the results. Moreover, this chapter covers the main conclusions of the study, examining the sustainability performance of Kabul University. The study directly tackles the research topics by presenting actual facts and offering insights into the environmental, economic, and social consequences of the university's activities.

Finally, Chapter 5 summarizes the findings of the study and draws conclusions within the research scope by evaluating the objectives established for the study. The contributions of this study and possible recommendations for future research are also outlined in this chapter. Additionally, the significance of Chapter 5 lies in its ability to amalgamate the knowledge acquired from the analysis, resulting in conclusive findings that directly pertain to the research objectives. This chapter also explores the wider consequences of the findings and proposes potential areas for further investigation, guaranteeing that the study's contributions to the field are clearly expressed.

CHAPTER 2

LITERATURE REVIEW

2.1 Higher Education's Importance

Higher education is one of the most important factors in a country's growth or decline. A free, modern, and dynamic higher education system helps a country move forward, improving the lives of its people (Ahmadi, 2022; Azimi & Balakarzai, 2020). Furthermore, universities worldwide are aggressively embarking on innovation to achieve excellence. This is important for a group like a higher education institution (HEI) to strengthen its role and its ability to innovate (Hamid et al., 2015). In this manner, higher education institutions directly contribute to SDG 4 (Quality Education), which is dedicated to ensuring that quality education is inclusive and equitable, and to promoting continuous learning opportunities for all.

The purpose of education is to instill a sense of global responsibility. Humans are the focal point of education regardless of the platform, environment, or society that humanity seeks to construct. Education can be viewed as a driver, a vehicle, a trigger, a fundamental value, or a crucial aspect of human development. The United Nations Educational, Scientific and Cultural Organization (UNSECO) believes that education is crucial to social, economic, and environmental development, as well as to the building of learning communities and the realization of a sustainable future. Higher education institutions are viewed as a connection between a local context and a larger worldwide area of knowledge (Chen et al., 2015).

Universities will be the main players in the third millennium, with new ideas and thoughts always giving society a boost. Higher education centers can help countries grow economically, socially, culturally, and politically (Mohammadi, 2020). Universities are essential participants in knowledge-based economy. They are centers of knowledge creation and the training of highly-trained knowledge workers who, in the long run, affect societies and economies (Johannes Glückler, Robert Panitz & A, 2019).Higher education is vital for sustainable development, As the world has more access to information from each other and the SDG is key point on the focus list. Universities, which have prioritized teaching and research, also have a broader responsibility to engage with society and contribute to sustainable development, known as the "third mission" (Trencher et al., 2014). Universities contribute in the SDGs 8 (Decent Work and Economic Growth) and 9 (Industry, Innovation, and Infrastructure) by fostering innovation and economic growth.

Moreover, within the framework of developing nations, HEIs possess the capacity to act as agents that can stimulate social and economic change. Universities not only provide education to future leaders and decision-makers, but also function as centers for research and innovation that can promote sustainable solutions (Lozano et al., 2013). The ability to bring about significant change is especially crucial in tackling the intricate issues mentioned in the United Nations Sustainable Development Goals (SDGs).

In developing countries such as Afghanistan, the presence of HEIs is of utmost importance in achieving sustainable development by nurturing human capital, encouraging originality, and addressing local challenges. The study conducted by

Babury and Hayward (2014) revealed that Afghanistan's HEIs have played a crucial role in restoring the country's intellectual and professional capabilities after decades of conflict. Furthermore, Mussawy and Rossman (2021) discovered that the efforts of Afghan universities to establish quality assurance methods have resulted in enhanced educational outcomes and greater alignment with national development goals. By fostering peaceful societies and bolstering institutions, they also support SDG 16 (Peace, Justice, and Strong Institutions). These examples highlight the transformative potential of higher education in developing countries, where universities function not just as educational institutions, but also as agents that stimulate social and economic development.

Higher education institutions play a crucial role in promoting sustainable development through various important mechanisms. Universities play a vital role in the generation and sharing of information that is essential for tackling sustainability concerns (Findler, Schönherr, Lozano, Reider, et al., 2019). Skills development involves providing students with the necessary abilities and capabilities to effectively adopt sustainable practices across different industries (Wiek et al., 2011). Higher education institutions promote the development and spread of sustainable technologies through innovation ecosystems. Universities have the ability to contribute evidence-based research that can be used to shape sustainable development policy (Siegfried et al., 2008). In addition, universities can actively participate in their “third mission” by directly collaborating with local communities to jointly develop and implement sustainable solutions (Trencher et al., 2014).

In order to overcome these difficulties and fully harness their capacity for change, HEIs in developing nations must incorporate sustainability into their curricula and research priorities (Lozano et al., 2013); enhance collaborations with the government, industry, and civil society (Trencher et al., 2014); explore novel funding strategies to bolster sustainability-oriented research and projects (Cloete et al., 2011), and strengthen the ability to work together across different disciplines in order to tackle complicated sustainability problems (Lang et al., 2012).

Existing literature lacks a comprehensive, integrated approach to assessing sustainability in post-conflict higher education institutions, particularly in Afghanistan. A comprehensive framework that includes environmental, economic, and social dimensions is required to guide strategic planning and resource allocation. This study attempts to close this gap by applying Organizational Life Cycle Sustainability Assessment (OLCSA) to Kabul University, serving as a model for other institutions in similar situations.

2.2 Brief History of Higher Education Systems in Afghanistan

Kabul University, which is the most important and oldest university in the country, is where higher education in the country started. Kabul University has been around since 1932 and has served many Afghan students who wanted to go to college. It has also been popular in the region and has attracted many students from other countries. Before the long war and fighting between different groups, Kabul University had a rich culture, a long history, and excellent teaching, learning, and research. Even though decades of war and instability in Afghanistan have destroyed the university, it is still the top choice for students in the country. After the British took over, Afghanistan had a time of relative stability and freedom. Afghanistan's higher education was at its best in the late 1960s when the country saw a rise in the number of educated people who were open to debate and more young people who were interested in politics (Azimi & Balakarzai, 2020; Giustozzi, 2010).

The development of Afghanistan's higher education system has been closely tied to the country's shifting political landscape (Ahmadi, 2022). Afghanistan's higher education system has been greatly shaped by the country's turbulent political past. The inception of institutions such as Kabul University in 1932 signified the initiation of contemporary higher education in Afghanistan. However, the progress and development of the system have been frequently interrupted and altered by political turmoil and armed conflicts (Babury & Hayward, 2013). Afghanistan must rebuild and fortify this system in order to meet SDG 4 (Quality Education).

Furthermore, modern higher education in Afghanistan has profound roots in the country's past—its centers of study in Herat, Kandahar, and elsewhere. It also has connections to European education, dating back to 1919, when King Amanullah sent some students overseas (Babury and Hayward, 2014). The Faculty of Medicine was the first institution of higher education to be formed in Afghanistan. It was founded in 1932 with the kind assistance of academics from Turkey (Mussawy & Rossman, 2021). The founding of the College of Medicine in Kabul in 1932 laid the groundwork for the current higher education system, which was quickly followed by the Faculty of Law (1936), the Faculty of Science (1942), and the Faculty of Letters (1946), all of which were merged in 1946 to become Kabul University. Nangarhar University, a second institution, was established in 1963.

Then, in 1969, Polytechnic University followed. As universities were growing slowly, Afghanistan's government set up the Ministry of Higher Education in 1977 to regulate and oversee all four-year HEIs (Mussawy & Rossman, 2021). Nevertheless, this phase of expansion was brief. The 1979 Soviet invasion and the ensuing civil war had catastrophic consequences for the education system. During this time, a large number of educated Afghans left the country, resulting in a substantial loss of highly-skilled individuals. This brain drain has had a lasting negative effect on the quality of higher education in Afghanistan, which persists to this day (Giustozzi & Ibrahimi, 2012).

In 1990, the system had 14,600 students, including around 10,000 at Kabul University, with women constituting 60% of the student body (M. O. B. and F. M. Hayward, 2014). During the Taliban government from 1996 to 2001, the higher education system was severely destroyed, especially for women who were completely prohibited from receiving an education. Afghanistan is currently facing challenges in overcoming a generational gap in education that was caused by a period of severe repression (Shayan, 2015). By 2013, the system had expanded to 31 public universities serving over 130,000 students and over 70 private colleges serving over 70,000 students (Babury and Hayward, 2014).

According to a 2012 study provided by the Afghanistan Ministry of Education, 10.5 million pupils attended 16,600 schools and training institutions during Hamid Karzai's presidency (2001-14). 38% of them were female pupils. Likewise, 770,000 seniors enrolled in 30,000 literacy classes. 62% of them were also women. Afghanistan now has approximately 30 governmental universities and 100 private universities and institutes (Khwajamir, 2016).

Afghanistan has one of the most centralized higher education systems in the world. It is made up of four main pillars of academic affairs, student affairs, administrative and financial affairs, and quality assurance and accreditation. The formal definition of the functions of higher education starts to give roles and responsibilities to each of the four pillars of the higher education system so that both public and private HEIs in the country can run well. The pillars are the most important central administrative units. They are made up of several directorates, commissions, units, and subunits with both academic and administrative staff to provide highly-centralized governance services to HEIs in the country (Azimi & Balakarzai, 2020; M. O. B. and F. M. Hayward, 2014).

Analyzing Afghanistan's experience in comparison to other countries that have faced post-conflict scenarios provides valuable perspectives. For example, Rwanda, which also had a devastating conflict in the 1990s, has made significant development in the rehabilitation of its higher education system. The approach utilized by Rwanda to align higher education with national development goals and give priority to science, technology, engineering, and mathematics (STEM) fields could offer useful lessons for Afghanistan (Mbabazi Bamwesiga et al., 2013).

Despite improvements, considerable difficulties persist. The Taliban's return in 2021 caused a 30% drop in female enrollment in higher education institutions. In 2021, 22.375 female students graduated from high school, but only about 12.5% of 179.000 took the national university admission exam. Furthermore, as of April 2022, 80% of secondary school girls (850,000 of 1.1 million in 2021) were unable to attend class (UNWomen, 2022). Economic instability further exacerbates the situation.

Addressing these challenges requires focused initiatives that prioritize gender equality, economic development, and quality assurance.

Moreover, the post-conflict higher education changes in Kosovo were designed to align with European standards and promote internationalization. This introduces a different way of thinking that should be considered (Bache & Taylor, 2003). Although Afghanistan has its own unique problems, these comparative examples demonstrate viable solutions for aligning and making consistent higher education with both national development goals and international norms. These examples could provide valuable perspectives for shaping future policy choices.

However, previous research has not effectively addressed the sustainability problems faced by Afghan higher education institutions. Studies on higher education in Afghanistan (Azimi & Balakarzai, 2020; Babury & Hayward, 2013; M. O. B. and F. M. Hayward, 2014; Mussawy & Rossman, 2021)frequently focus on access, quality, or governance without thoroughly examining the environmental, economic, and social components of sustainability. This study expands on previous research by using the OLCSA framework to provide a comprehensive knowledge of Kabul University's sustainability performance.

Although private universities are free to make their own decisions on finances and investments, the Ministry of Higher Education maintains sway over the academic affairs of both private and public universities through the appropriate directorates and commissions (Azimi & Balakarzai, 2020). Recent increases in student enrollment and system expansion are favorable indicators for expanding access to higher education, but the system has significant obstacles in terms of education quality, curriculum relevance, and resources (Mussawy & Rossman, 2021).

Although Afghanistan has made substantial strides in increasing the availability of higher education since 2001, the impact of past conflicts still influences the education system. The challenges encompass not only the task of reconstructing infrastructure and enhancing capability, but also the formidable obstacles of addressing long-standing societal differences and fostering trust. The implementation of the National Higher Education Strategic Plan (2016–2020) has been undertaken as part of recent changes to tackle quality concerns and enhance institutional independence. Nevertheless, the execution of the plan has been hindered by persistent security issues, political instability, and limitations in available resources (F. Hayward, 2015). As Afghanistan progresses, it has the crucial task of striking a balance between rapid expansion and quality improvement.

2.3 Impacts of Higher Education Institutions

The impacts are usually the effects that an organization or intervention (policy, program, project, product, technology, or measure) has on society or the natural environment outside of the organization. Several ideas about what "impact" means in the context of HEIs have been put forward. The UK's Research Excellence Framework (REF) defines research impact as "an effect, change, or benefit to the economy, society, culture, public policy or services, health, the environment, or quality of life beyond academia." Sustainability initiatives at HEIs have real-world effects on the health of the environment, policies, and the well-being of people. Traditional academic impacts, like scholarly influence, should be set apart from non-academic impacts on civil society, public policy, or the media. Also, the core parts of HEIs have their own impacts.

In order to provide a more organized classification of the impacts of higher education institutions (HEIs), the following Table 2.1 presents a thorough summary of the environmental, economic, and social aspects.

Table 2.1 : Summary of impacts of higher education institutions

Impact Category	Example
Environmental	Carbon emissions, resource consumption, and waste generation
Economic	Increased tax revenue, job creation, and innovation and technology transfer
Social	Community engagement, human capital development, health and well-being improvements, cultural and art events, preservation of heritage, diversity, and inclusion

It is imperative to acknowledge the interdependencies across these impact categories. For example, universities have economic impacts, such as the production of jobs, which in turn, have positive social impacts, such as improving the well-being of the society. The relationship between university presence and socio-economic development is clearly demonstrated in the research conducted by Valero and Van Reenen (2019). Their findings revealed that an increase in the number of universities in a region is linked to greater gross domestic product per capita and improved democratic involvement in that area. Moreover, Leal Filho et al. (2019) stated that implementing environmental measures on campuses can result in economic advantages by lowering operational expenses. This was proved in their study on sustainability practices in universities and HEIs.

Sustainability actions in these core areas have effects on society, the environment, and the economy as a whole. The impacts of sustainable development happen in a lot of different ways, especially in research and education. They can be direct or indirect, planned or unplanned, positive or negative, and they can happen right away or after a long time. They can also happen far away from the HEI or at a system level. The impacts of HEIs on sustainable development are an understudied component of the discourse, which has tended to overlook the fact that "impact encompasses real-world changes in ecological sustainability, policy, and people's well-being." This presents two issues. First, for a growing number of HEIs, the communication of their impacts on sustainable development is becoming a prerequisite for meeting expanding accountability demands from public and private donors, politicians, accreditation agencies, students, and faculty. Second, there is a lack of clarity and a diverse interpretation of the notion (Findler, Schönherr, Lozano, Reider,et al., 2019).

One fundamental job is to discern the various ways in which universities and other HEIs can potentially contribute to regional economic growth. Modern universities embody a diverse set of missions and organizational goals that have varying effects on their surrounding regions, as well as the broader national and international economic contexts, ranging from traditional functions, such as teaching and public service, to more recent activities, such as licensing inventions and engaging in collaborative research efforts with private-sector industries (Drucker & Goldstein, 2007; Goldstein & Drucker, 2006).

Sustainability assessment and reporting practices in HEIs have gained increasing importance. Consequently, a body of work dealing with sustainability assessment and reporting has developed within the wider literature on sustainability in higher education over the past decade. The main objectives of sustainability assessment and reporting are assessing organizations' sustainability, such as HEIs' sustainability; communicating it to its stakeholders; benchmarking against other organizations; analyzing how the organization affects and is affected by stakeholders; assessing and improving sustainability performance over time; and planning the future direction of change toward sustainable development in HEIs (Findler, Schönherr, Lozano, & Stacherl, 2019).

Additionally, the impacts of HEIs are diverse and can be classified into several main domains: economic, social, and environmental. Each of these domains encompasses various consequences that HEIs have on society and the environment, and comprehending their interconnections is vital for a comprehensive evaluation of their overall influence.

2.3.1 Environmental Impacts of Higher Education Institutions

The impacts of HEIs are commonly characterized as the consequences that an organization or action has on society or the natural environment, extending beyond the organization itself. These effects can be classified into economic, social, environmental, and cultural aspects. As per the UK's REF, research impact is described as "the influence, alteration, or advantage to the economy, society, culture, public policy or services, health, the environment, or quality of life that goes beyond academics" (Findler et al., 2019).

Furthermore, the impacts are usually the effects that an organization or intervention (policy, program, project, product, technology, or measure) has on society or the natural environment outside of the organization. Several ideas about what "impact" means in the context of HEIs have been put forward. The UK's REF defines research impact as "an effect, change, or benefit to the economy, society, culture, public policy or services, health, the environment, or quality of life beyond academia." Sustainability initiatives at HEIs have real-world effects on the health of the environment, policies, and the well-being of people. Traditional academic impacts, like scholarly influence, should be set apart from non-academic impacts on civil society, public policy, or the media. Also, the core parts of the HEIs have their own effects. Sustainability actions in these core areas have effects on society, the environment, and the economy as a whole. The effects of SD happen in a lot of different ways, especially in research and education. They can be direct or indirect, planned or unplanned, positive or negative, and they can happen right away or after a long time. They can also happen far away from the HEI or at a system level (Findler, Schönherr, Lozano, & Stacherl, 2019).

Organizations do not operate in isolation; their functioning has a significant effect on the external environment. This effect can manifest as the utilization of natural resources as part of its production processes, the effect of competition between itself and other organizations in the same market, the enrichment of a local community through the creation of employment opportunities, the transformation of the landscape as a result of raw material extraction or waste product storage, and the distribution of wealth created within the firm to the owners of that firm (via dividends) and the workers of that firm (Nejati et al., 2011).

Organizations like businesses and universities are usually blamed for the severe environmental damage we have seen. No matter where an organization is located, its decisions and actions will always affect the natural environment. These effects may be caused by the way the organization uses living and non-living resources, causes pollution and waste, and affects natural habitats through its activities, products, and services. Organizations should use an integrated approach that looks at how their decisions and actions affect the economy, society, and the environment as a whole in order to reduce their negative effects on the environment. Humans need to take care of the environment if they want to stay alive and do well (Nejati et al., 2011).

Historically, addressing the current situation of the global natural environment is one of the most pressing and major concerns (Ralph & Stubbs, 2014). Findler et al. (2019) studied the impacts of institutions of higher education and universities on sustainable development. Energy consumption, water footprint, land use, acidification, use of abiotic resources, waste generation by its type, and climate change could be considered as the recommended categories that are most likely to be triggered with the provision of educational facilities by institutions (Lo-Iacono-Ferreira et al., 2017, 2018).

Higher education institutions have various environmental implications, such as their consumption of energy, water, and land, as well as their generation of trash and contributions to climate change. Lo-Iacono-Ferreira et al. (2017, 2018) identified these as primary categories that are likely to be impacted by the availability of educational facilities.

Hence, the minimum environmental impacts resulting from providing educational services at Kabul University are land use, fuel consumption, water use, and waste generation. In order to study the indirect emissions and resources consumed, primary data are needed to calculate the direct emissions and resources (Lo-Iacono-Ferreira et al., 2017). It is the liability of organizations to collect quality data to guarantee that the inventory reflects the state of their organization in an appropriate way (UNEP/SETAC, 2015). It is frequently stated that the increased density of occupation caused by shared student housing creates issues with garbage collection, street cleaning, and (particularly) parking, and that the rate of burglaries is typically higher in student-dominated districts (Hubbard, 2008).

The task of measuring the environmental impacts of HEIs poses various methodological challenges. These factors encompass establishing suitable system boundaries, considering indirect impacts, and guaranteeing the accuracy and uniformity of data across many organizations. Findler et al. (2019) emphasized the need to use standardized assessment frameworks to facilitate meaningful comparisons between different institutions and monitor progress over time.

2.3.2 Economic Impacts of Higher Education Institutions

Roger et al. (1995) defined the economic impact as the difference between the actual economic activity in a region due to the institution's presence and the level of economic activity that would have existed had the institution not existed. This impact could be measured as differences in annual economic activity flows or, to account for the institution's effects on the region's human capital stock and technology foundation, as the discounted value of differences in future economic activity flows.

Throughout the history of the economy, institutions have set the rules for how people interact with each other and helped set up the main sources of growth during the process of economic change. This fact explains why the managed economy and the entrepreneurial economy have an effect on political, social, and economic issues (Guerrero et al., 2015). Reforms in Europe transformed their universities into modern institutions, conceptually founded in mainstream new public management, emphasized the professionalization of institutions, and introduced them to a new business-like culture known as “output-oriented” or “target culture”. These reforms have greatly impacted Poland's public economic universities. They made swift, often harsh financial and organizational changes to avoid financial instability (Jelonek & Mazur, 2020).

Universities and colleges frequently assert that they produce jobs, increase tax revenue, and promote the local economy (Siegfried et al., 2007). The economic impact of universities should be evaluated from three vantage points: the value of their products, the income they generate, and the direct jobs they create (Pastor et al., 2013). Higher education contributes significantly to economic growth and social progress. Nonetheless, the uneven development of higher education in China has become a major factor restricting its overall success (Wu et al., 2020).

In order to effectively contribute to creative performance, universities must be willing and able to become entrepreneurial organizations that translate knowledge into social and economic value (Marozau et al., 2021). Johannes Glückler, Robert Panitz & A, (2019) stated in their study that the effect analysis begins with universities' gross expenditures in 2012, which totaled €3.049 billion for investments, products, and personnel, and €1.568 billion for student consumption. These two numbers add up to a total gross demand of €4.6 billion, which serves as the starting point for calculating the direct, indirect, and induced effects. In addition, the expenditures on goods and investments at state universities contributed €315 million in gross value creation to the Baden-Württemberg economy, while the consumption expenditures of its workers and students contributed €886 million. Based on Siegfried et al. (2007) quoted from newspapers in their study that "Loyola University Chicago generated a $1.04 billion economic impact and created or sustained nearly 15,000 jobs in the Chicagoland area in 1994" and "in addition to the $9.7 billion in 'output impact' generated by the University of Georgia System, public higher education is responsible for 2.8% of Georgia's workforce, or 106,831 full- and part-time jobs."

Over the past 20 years, both the research and policy communities have become more interested in understanding and modeling the effects that colleges and universities have on local and national economies (Drucker & Goldstein, 2007; Goldstein & Drucker, 2006). Changes in the regional and international economies, like the globalization of trade and the shift in developed economies from traditional manufacturing to production and services that require a lot of knowledge, have drawn a lot of attention to this issue. State and regional economic development agencies in the United States and other economically developed countries are moving more and more toward strategies that will help their regions take advantage of the growing knowledge-based economy (Drucker & Goldstein, 2007; Goldstein & Drucker, 2006; Hayter & Link, 2015). Many of these plans have focused on public universities as the main places where knowledge is made available to the public. Several people who have looked at the literature on university impact studies have said that spending studies have not been able to capture and measure the economic effects of university activities very well (Drucker & Goldstein, 2007).

Universities also have quantitative short-term monetary consequences in addition to these qualitative long-term effects. What the university and its members spend on regional products and services stimulates autonomous demand and boosts regional production and employment (Johannes Glückler, Robert Panitz & A, 2019). Further insights into how university operations contribute to regional social and economic development are the primary consequences for university administration teams. The difficulty for university administration teams is to align their mission with regional and external requirements. Leaders of universities must pay careful consideration to their knowledge transfer systems and the accompanying contextual dynamics in order to increase their efficacy and enable them to have a sustainable economic impact. Still, each university needs to make sure that money is spent wisely so that it can keep supporting each activity and improving its ability to organize. Production capital underpins economic impacts. Depending on the institution, this capital is used in different ways to help keep scientific excellence going (Guerrero et al., 2015). The economic activity of a university can be separated into four categories: university spending on products and services and investment, direct revenue production through staff payments, student spending, and guest spending (Pastor et al., 2013).

Moreover, the mission of the university is intimately tied to investment: investment by students as they build their human capital stock, and investment by universities as they increase their knowledge and technology capital stocks. Although the economic impacts of HEIs are well acknowledged, accurately measuring these impacts poses several challenges. Pastor et al. (2013) observed that traditional economic impact studies frequently overlook the complete spectrum of long-term advantages, such as the development of human capital and the development of innovation. Furthermore, it is a considerable analytical problem to differentiate between the economic impacts that can be directly attributed to the organization and those that would have happened regardless of its presence remains a significant methodological challenge.

From this perspective, the economic benefits of these investments are the enhancements in the quality of production elements and, consequently, the productivity and economic repercussions that will follow. However, the economic influence of HEIs extends far beyond. Universities utilize the economic, financial, and labor resources of their surrounding communities (Pastor et al., 2013). In addition to their long-term benefits, these institutions also contribute to the total economic activity in a specific region. Both investments (i.e., current expenditures on goods and services and salaries and wages provided to employees) have a substantial effect on the local economy where they are situated (Pastor et al., 2013).

Moreover, an average institution of higher education has around 2,500 students living in privately rented housing. In addition, this niche is characterized by special methods of subdividing, renting, and managing housing, and landlords are often able to collect a higher rent from a four- or five-student household than they would from a family using the same space. In general, this approach is believed to fuel home price inflation in university towns; between 2000 and 2005, the average growth in property prices in the cities and towns of the 20 best-performing institutions was 88%, compared to the UK average of 83% (Hubbard, 2008).

Consequently, it is crucial to acknowledge that these impact categories frequently have interconnections. For instance, the economic consequences can result in societal transformations, whereas environmental endeavors can yield economic impacts. Gaining a thorough understanding of these interconnections is essential in order to make a comprehensive assessment of the overall impacts of HEIs on sustainable development.

2.3.3 Social Impacts of Higher Education Institutions

Higher education institutions make varied contributions to society (Pastor et al., 2013). Higher education is a crucial political and social issue in developed nations. Demand for higher education has exploded over the past several decades, resulting in the development of new institutions in numerous wealthy nations. Although a number of academics have investigated the factors that influence the demand for higher education, less emphasis has been paid to the impact of supply factors on educational decisions (Oppedisano, 2011).

The contribution of universities to society is attributable to both supply- and demand-side impacts (Pastor et al., 2013). Chen et al. (2015) stated that university social responsibility is a philosophy or principle for social movements, which can be interpreted as the philosophy of a university to use an ethical approach to develop and engage with the local and global community to sustain the social, ecological, environmental, technical, and economic development.

During the past two centuries, universities have transformed from information accumulators, generally isolated from society to knowledge hubs, which are firmly immersed in systems of innovation and assume the responsibility of fostering economic and social progress. Numerous environmental influences have compelled universities to reorganize their teaching and research operations in order to meet societal needs for human capital and a form of knowledge pertinent to the development of enterprises and the promotion of social welfare (Marozau et al., 2021).

Although plainly limited to cities with HEIs, the phenomenon of "studentification" develops particular urban landscapes whose social and cultural components must be examined; nevertheless, there has been a lack of study tracing the effects of students on "host" towns, with the majority of geographical work focusing on the economic effects of universities on their local communities instead of issues of social cohesiveness (Hubbard, 2008).

Contradictory social, cultural, economic, and physical changes are brought about by an inflow of students into privately rented housing in specific neighborhoods (Hubbard, 2008). Research from the past shows that universities can have "significant environmental impacts." As has been said, many of them could even be called "small towns" because they are big, have a lot of people and cars moving around, use a lot of materials, and have a lot of complex activities. Hence, it follows that universities should be responsible to society and their stakeholders (Nejati et al., 2011). Oppedisano (2011) stated that in Italy, the university policy that encouraged local institutions has made opportunities more equal across the country by giving more people access to higher education and making family background less important in deciding whether or not to go to university.

University social responsibility is a concept that highlights the moral responsibility of universities to actively participate in local and global communities in order to enhance social progress (Chen et al., 2015). Nevertheless, the occurrence of studentification can cause substantial social and cultural transformations in cities with universities, frequently leading to conflicts between students and permanent citizens (Hubbard, 2008).

Universities can generate population shifts among students, staff, and those engaged in university operations (participants in congresses, seminars, conferences, etc.). Universities also contribute to the socio-economic environment by supplying a variety of intangible assets, such as cultural property, and by supporting a cultural environment. Universities generate additional externalities as well, such as cultural activities, geographical advantages for businesses, environmental repercussions, etc. (Pastor et al., 2013). Colleges have a role in supporting democracy over and above their influence as human capital generators (Valero & Van Reenen, 2019).

However, the significant social impact, as noted by (Hubbard, 2008) in his study, although highly exaggerated, suggests that media reports indicate environmental and social transformations occurring in districts experiencing student expansion, where gardens are overgrown, garbage is thrown outside, and sheets are used as makeshift curtains.

Even though there are parts of UK cities that are physically and financially good for students to live in, the growing number of news stories about the bad social effects of studentification shows that this is not a process that is accepted without question. In fact, in many of the places where studentification is most noticeable, like Headingley (Leeds), Selly Oak (Birmingham), and Lenton (Nottingham), groups of locals have banded together to fight against student housing. On the other hand, there seem to be a lot of places where there are a lot of students, but there is not much evidence of social conflict between the students and the locals. For example, large numbers of students have lived in Manchester and Brighton without any major protests (Hubbard, 2008).

The social impacts of HEIs are multifaceted and frequently challenging to quantify. Chen et al. (2015) highlighted the significance of taking into account both positive and negative social impacts, such as improved social mobility in addition to potential disruptions within the community. Methodological challenges in evaluating social impacts encompass the enduring nature of numerous consequences, the complexity in demonstrating causality, and the necessity to take into account varied stakeholders' viewpoints.

Due to this selective studentification, a group of worried residents has formed the Storer Road Residents Association and has been running a campaign to bring attention to the bad things that have happened because of it. This group says they are not against students, but they say that the number of rented houses has thrown the community out of balance. Another problem of students for long-term residents is the influx of students has caused traffic and parking problems on certain streets. They say that too many three-car households on small streets where there is not enough off-street parking causes big problems (Hubbard, 2008).

Additionally, the study conducted by Oriya (2019) revealed significant disparities in sustainability practices among Asian countries in HEIs. Higher education institutions in countries located in the Far Eastern region, such as Indonesia, Malaysia, and Thailand, are widely recognized for their extensive implementation of sustainability practices.

Finally, the process of measuring and evaluating the environmental, economic, and social impacts of higher education has methodological difficulties. These challenges encompass the complexities of measuring indirect effects, determining causality, and considering external variables. In recent years, there has been an increased emphasis on sustainability evaluation and reporting standards. The overall aim is to analyze the contributions of HEIs to sustainable development (Findler et al., 2019).

2.4 Conceptualization of Sustainability and Its Constituents and Dimensions

The concept of sustainability is intricate and constantly changing, encompassing the optimization of interdependent economic, social, and environmental factors (Rivero & Lee, 2022). The concept has been the subject of numerous interpretations and debates throughout history, which is indicative of the dynamic character of sustainability science.

Sustainability is a complex theorem governed by the optimization of interdependent economic, social, and environmental aspects (Rivero & Lee, 2022). The issue of sustainability is crucial for all nations, but especially for those with rapid economic growth (Ovais, 2023). People have been worried about the relationship between the environment and the growth of people and economies for thousands of years.

Before the early 1960s, people talked about this relationship in terms of the lack of local resources. Early writers like Thomas Malthus, who wrote An Essay on the Principle of Population in 1798, captured this idea well by showing how population growth and food supply growth are related. Malthus showed that the size and well-being of the human population will always be limited by the amount of food available. This is because the number of people can grow exponentially, but food production can only grow linearly as more land is cultivated. Malthus did not take resource degradation into account in his calculations, but David Ricardo did when he wrote about how to define and measure resource rent. Environmental degradation was not part of their arguments at first, but it became one as more evidence showed how industrialization could hurt the environment and people's health. Starting in the early 1960s, this turned into a global conversation about the challenge of making sure economic growth happens while still meeting social and environmental goals (Davidsdottir, 2012).

Based on Moldan et al. (2012), the terminology "sustainable development" was introduced in the 1980 World Conservation Strategy of the International Union for conservation of Nature (IUCN). It is stated that "for development to be sustainable, it must take account of social and ecological factors, as well as economic ones" (Moldan et al., 2012; Nature & Fund, 1980). As a result of the severe environmental difficulties caused by rapid economic expansion, both academia and business are paying increased attention to a company's sustainable performance. It has been demonstrated that industrial businesses are directly or indirectly responsible for environmental degradation. Thus, corporations are increasingly subject to both internal and external demands to build a system of environmental and social responsibility. In response to this circumstance, numerous firms are investigating ways to reduce the impact of their operations on the environment and society, thereby enhancing their sustainability performance. The first and most important step toward achieving this objective is conducting a scientific assessment of a product or a company's environmental sustainability (Jiang et al., 2018).

The 1980 World Conservation Strategy of the IUCN introduced the term “sustainable development,” which underscored the necessity of considering social and ecological factors in addition to economic ones (Moldan et al., 2012). The concept of sustainability has developed over time to resolve the intricacies of balancing economic growth with environmental protection and social equity. The Brundtland Commission's definition of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” has become a cornerstone in the sustainability discourse (Brundtland, 1987).

The fact that it is hard to define sustainability shows that “sustainable development” is a complicated issue with many different parts. It combines efficiency, and fairness between generations based on economic, social, and environmental factors (Ciegis et al., 2009). The Commission of Brundtland defined sustainable development as “a development that is capable of covering today's needs for an intact environment, social justice, and economic prosperity, without limiting the ability of future generations to meet their needs” (Brundtland, 1987). Ariana (2016) defined sustainable development as “a multidimensional concept aimed equally at the environmental component in sustainable consumption of natural resources, protection of environment factors, health care for the population, the social side by equality, quality of life, and stop poverty, and economic by increasing sustainability."

The current debates in sustainability science encompass the concept of planetary boundaries and the debate between strong and feeble sustainability. Natural capital should not be replaced by human-made capital, according to strong sustainability advocates, who underscore the intrinsic value of natural ecosystems. Conversely, weak sustainability advocates posit that human-made capital can serve as a substitute for natural capital, provided that the general welfare is preserved (Neumayer, 2003). Nine critical thresholds that should not be exceeded in order to prevent catastrophic environmental changes are identified by the planetary boundaries framework, which was developed by Rockström et al. (2009). Contemporary sustainability policies and practices have been significantly impacted by this framework.

Flint (2013) mentioned that Norton (2005) introduced this simple definition of sustainability by calling it "schematic," where the definition of sustainability can be made more specific by communities that choose their own actions and indicators based on their own values. When choosing goals, priorities, and indicators in an open, deliberative, and democratic way, each community will have to fill in the details of its own sustainability criteria. No outside definition could fit all of the local values or replace the process of making a schematic (Flint, 2013; Norton, 2005).

Several researchers have investigated this matter and tried to come up with an all-encompassing definition of the word sustainability. Sustainability is a big and varied idea that means different things in different fields and situations. The word sustainability has been used to talk about how people affect climate change, as well as a wider range of issues, such as pollution and biodiversity. Even though sustainable development can be set and interpreted in many different ways, its basic idea is to find a balance between the needs and awareness of the environment, the economy, and the social and political limits of the country (Omran et al., 2021). Therefore, the United Nations General Assembly made sustainable development by 2030 through the introduction of a special agenda in 2015. There are 17 SDGs and 169 goals on the agenda. The 17 goals are separated into three categories: social, environmental, and economic sustainability, as well as the five Ps (planet, people, peace, prosperity, and partnership) (Herrero et al., 2021).

Sustainability is impacted by all organizations, whether positively or negatively. Therefore, it is important to evaluate the sustainability of any human activity, products, and development. Life cycle sustainability assessment (LCSA) is among the most encouraging methods for evaluating sustainability. Furthermore, the environmental, economic, and social issues of the world are caused by industry and globalization, which has been the subject of discussion for decades (Omran et al., 2021). In these kinds of situations, the SDGs can lead the country toward sustainable development while making sure that there are enough resources, they are used efficiently, everyone is doing well, and the workplace is safe. One of the goals of putting the SDGs into action is to build a strong, creative, and people-centered economy that will provide jobs and a high standard of living. It puts a lot of weight on the well-being of all living things, including people, as well as their prosperity and the fact that their economies can grow as much as they want (Di Vaio et al., 2020; Trung et al., 2021). The Figure 2.1 designate the relationship of the three dimensions of sustainability.

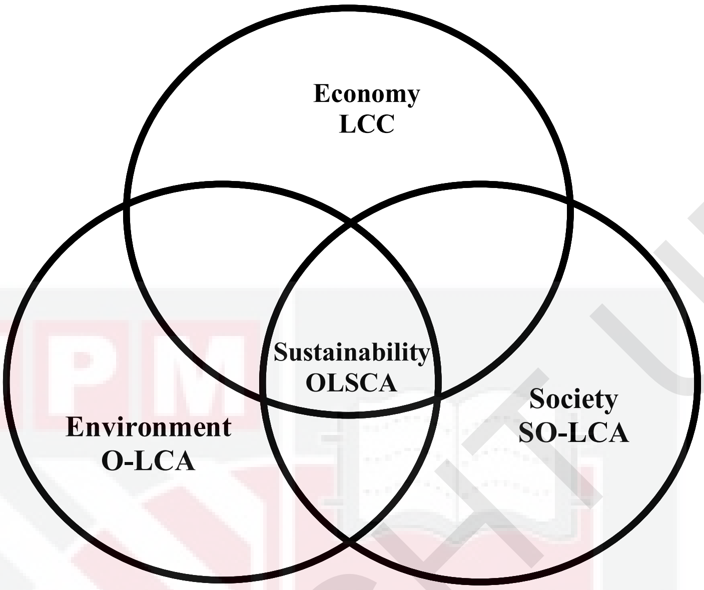

Figure 2.1 : Three dimensions of sustainability using OLCSA

Sustainability means thinking about the past to plan for the well-being of future generations. A good way to plan for the next three generations is to look back at the last three generations and see how people dealt with the changes. Society can learn from history by looking closely at the lessons learned from all of the failed civilizations in the past, especially by looking at how society and technology have changed on a global scale in the last 200 years (Flint, 2013).

To begin, the concept of sustainable development is pragmatic and anthropocentric. It is largely concerned with individuals and their well-being. Our needs are at the heart of sustainability. Moreover, “healthy, productive, and in harmony with nature” is how life should be for people. This principle means that people should try to find a balance between the three pillars of sustainable development. Human life is neither independent nor isolated; it is part of a complex web of natural and social events and depends on a wide range of relationships and interdependencies. In particular, the need for "harmony with nature" is emphasized, which is part of the environmental pillar. Additionally, a key aspect of sustainability is its dynamic and enduring nature. The formulation takes "current and future generations" into account while highlighting the changing circumstances and emphasizing worries for the future without a specific time limit or objective. The time dimension emphasizes a necessary extension, perhaps a very lengthy extension above and beyond the average human life. These three straightforward ideas are applicable to all three pillars (Moldan et al., 2012).

Sustainability in higher education is conceptualized by incorporating sustainability principles into campus operations, research, instruction, and community engagement. According to Lozano et al. (2013), universities are essential in the promotion of sustainability because they educate future leaders, undertake interdisciplinary research, and implement sustainable practices on campus. Universities' "third mission", which entails societal engagement, underscores the significance of HEIs in promoting sustainable development at the local, national, and global levels.

Finally, from this point of view, sustainability is not a set of future social conditions that will help us meet these three imperatives or something like them. It is not even a matter of getting closer to a certain idea of what that would mean. Instead, sustainability is what happens when people talk about the kind of world they want to live in now and in the future (Robinson, 2004).

In conclusion, the understanding of sustainability has undergone substantial changes throughout the years, mirroring the increasing intricacy and immediacy of sustainability issues. To advance SDGs, it is crucial to actively participate in ongoing discussions and fully comprehend the distinct role that HEIs play in promoting sustainability. Further investigation should persist in examining these dynamics and constructing resilient frameworks for incorporating sustainability into all facets of higher education.

2.5 Three Pillars of Sustainability and Their Relationship with Organizations

Sustainability is considered one of the most important things on the world policy agenda (Kaivo-oja et al., 2014). Sustainable development aims to achieve an equilibrium between development and conventional concepts of growth by including environmental and social factors in economic development (Ciegis et al., 2009; Connelly, 2007). The environmental, social, and economic pillars function as enduring principles that guide global development in the long term. Nevertheless, the three-pillar model is not without its drawbacks and has faced criticism for its tendency to oversimplify the intricate interconnections among these aspects (Kuhlman & Farrington, 2010).

The achievement of sustainability ranks among the highest priority items on the global policy agenda (Kaivo-oja et al., 2014). Sustainable development creates a balance between development and traditional notions of growth, integrating environmental and social considerations into economic progress (Ciegis et al., 2009; Connelly, 2007). The environmental, social, and economic pillars serve as long-term global development guiding principles. Moreover, overlapping areas, such as environmental, economic, and social, offer additional opportunities for sustainable development. Sustainability can be broken down into three parts, and the idea of sustainability has two parts. The first is to break it up into three parts: environmental, economic, and social. The second is to figure out which parts are strong and which ones are weak (Kuhlman & Farrington, 2010). Sustainability is rapidly rising as a top global priority (Chang et al., 2016; Kalvani et al., 2022). Economic, environmental, and social facets are the three pillars of sustainability (Kalvani et al., 2022).

A significant critique of the three-pillar paradigm is its treatment of the economic, social, and environmental elements as distinct and equivalent entities, which may result in a fragmented approach to sustainability. Detractors contend that this model is inadequate in capturing the many interconnections and compromises among these elements. For example, economic expansion frequently occurs at the cost of environmental deterioration, and concerns regarding social fairness might be disregarded in the quest for economic goals (Kuhlman & Farrington, 2010).

Alternative frameworks, such as the nested model and the doughnut economics model, offer more comprehensive approaches to understanding sustainability. The nested model conceptualizes the economy as being contained within society, which is in turn contained within the environment. This perspective emphasizes that economic activities are limited by the boundaries established by society and the environment (Giddings et al., 2002). Doughnut economics, as introduced by Raworth (2017), integrates the concept of planetary boundaries with social foundations to establish a "safe and equitable space for humanity." This paradigm attempts to achieve a balanced and mutually beneficial state between ecological sustainability and social equality.

Within the realm of higher education, these alternate frameworks offer valuable perspectives for incorporating sustainability into university operations, teaching, and research. Universities can utilize the layered model to get insights into how their economic activities, such as campus operations and investments, are limited by social factors like community participation and equity, as well as environmental factors like resource consumption and emissions. Universities can utilize the principles of doughnut economics to effectively manage their ecological footprint and social impact. This approach ensures that universities contribute to both environmental sustainability and social well-being (Lozano et al., 2013).

All organizations make a difference to the SDGs, either for the better or for the worse, through their own actions and relationships. Therefore, organizations are very important in achieving these goals. Sustainability reporting is how an organization tells the public about its economic, environmental, and/or social effects, which can help or hurt the SDGs. This process is governed by the Global Reporting Initiative (GRI) guidelines. The major economic, environmental, or social effects and how they are reported must be in line with what is generally accepted. The rules and standards of the GRI give businesses and other stakeholders a common language to talk about and understand how an organization affects the economy, the environment, and society. With these ideas, organizations will be more accountable and open, and information about these effects will be easier to compare and of higher quality on a global scale. Sustainability reporting that follows the GRI guidelines will give a fair and accurate picture of the good or bad effects an organization has on the SDGs. Internal and external stakeholders can use the information in the sustainability report to decide how the organization will help reach the SDGs (GRI GSSB, 2020).

It focuses on a series of concerns that go to the heart of the interconnected discussions over environmental, social, and economic conditions. These are valid issues, and addressing them directly is a prerequisite for successful advancement. The debate over the notion and practice of sustainability brings these concerns to the forefront in an especially sharp manner (Robinson, 2004).

To summarize, although the three-pillar model of sustainability is a valuable first framework, it is crucial to acknowledge its limits and investigate alternate frameworks that provide a more comprehensive understanding of sustainability. Higher education institutions can derive advantages from these alternative models by embracing comprehensive strategies that tackle the intricate interconnections between economic, social, and environmental aspects. Further investigation should be conducted to examine these concepts and devise effective approaches for implementing them in higher education settings.

2.6 Sustainability of Higher Education Institutions

The most prevalent justification for this definition is that sustainability places a strong emphasis on simultaneously maximizing environmental performance, economic concerns, and social concerns (Pintarič & Kravanja, 2006). Although sustainability in higher education is a matter of global importance, institutions in poor nations encounter distinct difficulties and possibilities. In the context of Afghanistan and other developing nations, the issues frequently encompass scarce resources, political instability, and the necessity to reconcile present educational requirements with long-term sustainability objectives (Leal Filho et al., 2019).

The three pillars of sustainability, encompassing the environment, economy, and society, are frequently assessed using LCSA (Chang et al., 2012; Omran et al., 2021). The three approaches that make up the LCSA methodology are life cycle assessment (LCA), life cycle costing (LCC), and social life cycle assessment (S-LCA). The formula of the LCSA framework is LCSA = LCA + LCC + S-LCA (Klöpffer & Renner, 2008).

Implementing extensive frameworks in HEIs of developing nations might be difficult due to limited data and budget restrictions. In the context of Afghanistan, it may be necessary to prioritize pressing sustainability issues, such as enhancing energy efficiency, promoting water conservation, and improving waste management (Meschede, 2020).

Education is an essential instrument for sustainable development, but its application at HEIs in underdeveloped countries needs to be thoughtfully adapted to local circumstances. In the context of Afghanistan, it is necessary to tackle both environmental issues and ensure social and economic sustainability in a period after conflict (Hayward, 2015).

Several case studies carried out in developing countries offer useful insights that may be applicable to the specific situations of Afghanistan. An investigation conducted by Leal Filho et al. (2018) analyzed sustainability endeavors in colleges located in several poor nations, such as Kenya and India. The study emphasized the successful integration of sustainability principles into the curricula and operations of certain colleges in situations with limited resources (Findler, Schönherr, Lozano, Reider, et al., 2019; Leal Filho et al., 2018).

Additional case studies conducted in developing countries provide valuable insights for Afghan institutions. Khalaf-Kairouz (2012) studied sustainability initiatives in Lebanese universities and found that despite the challenges posed by post-conflict circumstances, these institutions were able to achieve substantial development in environmental sustainability by implementing focused interventions. For example, the American University of Beirut successfully developed a thorough waste management program that resulted in a 40% reduction in campus garbage within a span of three years. These findings provide vital knowledge for Afghan organizations, indicating that targeted environmental efforts can provide significant results even in contexts with limited resources.

Similarly, in a study conducted by Najafian & Karamidehkordi (2018) on Iranian universities, it was shown that integrating sustainability into curriculum and research activities had a significant positive impact on students and the community. The University of Tehran's “Green Campus” initiative, which engaged students in campus sustainability projects, resulted in a remarkable 25% decrease in energy use and a notable increase in students' environmental consciousness. This strategy could be especially relevant for Afghan universities seeking to foster a culture of sustainability among their students.

A study conducted by Tiyarattanachai & Hollmann (2016) in the African context emphasized the significance of partnerships in addressing resource limitation at Kenyan universities, with a specific focus on sustainability practices. Kenyatta University's partnership with local businesses and non-governmental organizations (NGOs) for sustainability initiatives not only decreased implementation costs, but also improved the university's involvement with the community. Afghan universities suffering budget limitations could particularly benefit from this partnership model.

In conclusion, these overseas models provide valuable insights. It is essential to tailor sustainability measures to the specific requirements and obstacles faced by Afghan HEIs. This may entail giving priority to fundamental infrastructure enhancements, incorporating sustainability into the process of rebuilding, and concentrating on educational initiatives (Hayward, 2015).

2.7 Basic Knowledge/Theories

Organizational life cycle sustainability assessment (OLCSA) is a methodology that expands the scope of traditional LCA to include the evaluation of organizations. The methodology is founded on the ideas of life cycle thinking (LCT) and the frameworks outlined in ISO standards, specifically ISO 14040 and ISO 14044. These standards primarily address environmental management and LCA methodologies (Manzardo, Loss, Niero, et al., 2018). These core theories provide a good platform for sustainability assessment, but they must be critically examined in relation to HEIs. Considering the unique role of universities in society requires a more complex theoretical approach that considers their education, research, and community engagement objectives. The fundamental theories and principles that form the foundation of organizational life cycle assessment (O-LCA) are:

1. Life cycle thinking: It is the fundamental concept that underlies both LCA and OLCA. However, LCT in HEIs brings particular obstacles. Universities have a less defined "life cycle" than product-based enterprises. Lozano et al. (2013) suggested that HEIs broaden LCT to incorporate long-term social and environmental implications of education and research.

2. Systems theory: Social organizational life cycle assessment (SO-LCA) analyzes the organization as a whole using a systems approach. Universities are complex systems with interrelated parts, making this idea relevant to HEIs. The systems view is suitable for analyzing institutions' transformational potential of sustainability transition (Stephens & Graham, 2010). This method identifies and evaluates the organization's comprehensive environmental impacts, including indirect and long-term ones (Ciroth et al., 2011). Although systems theory provides a useful framework for understanding HEIs, its implementation in post-conflict contexts like Afghanistan requires the examination of additional factors, such as political instability, limited resources, and the imperative for rapid rehabilitation. Babury and Hayward (2014) proposed that in these circumstances, systems theory should be modified to accommodate the different problems encountered by HEIs. External factors, such as security concerns and financing uncertainties, can disturb the incorporated resilience of university systems in Afghanistan. Hence, it may be more suitable to utilize a revised systems approach that integrates resilience thinking while examining sustainability transitions in Afghan universities and HEIs.

3. Sustainability theory: The theory of sustainability underlies the concept of O-LCA, which seeks to evaluate and enhance the environmental efficiency of organizations in a manner that promotes long-term ecological equilibrium and optimal use of resources (WCED, 1987). Higher education institutions must include "education for sustainable development" in sustainability theory. education for sustainable development" educates students to make informed decisions and take responsible actions for environmental, economic, and social

justice (UNESCO, 2017). Furthermore, according to this theory, HEIs should practice sustainability and teach sustainability literacy and leadership.

4. ISO standards: The principles and structure outlined in ISO 14040 and ISO 14044 are essential for conducting O-LCA. These standards establish the organized framework for conducting LCAs, which is modified for organizational evaluations in O-LCAs.

5. Stakeholder theory: Organizational life cycle assessment O-LCA frequently integrates stakeholders' viewpoints, acknowledging the significance of taking into account the opinions and interests of different stakeholders, such as consumers, suppliers, regulators, and the community, when evaluating an organization's environmental effects (Freeman, 2010). However, the stakeholder theory is complicated for HEIs because they have students, teachers, staff, alumni, local communities, governments, and industry partners. Disterheft et al. (2015) suggested that stakeholder-based participatory techniques are essential for higher education sustainability projects. Within the context of Afghan higher education, the stakeholder theory becomes more complex as a result of the participation of international donors, NGOs, and government agencies in the process of rehabilitation and developing the universities. Mussawy and Rossman (2021) highlighted the significance of maintaining a balance between the diverse stakeholders' interest in Afghan HEIs, specifically regarding quality assurance and accreditation procedures. In post-conflict educational context, it is necessary to utilize the stakeholder theory in a more nuanced manner, taking into account the distinct power dynamics and conflicting priorities that exist.

Through the integration of various theories and frameworks, O-LCSA offers a comprehensive and strong method for assessing and enhancing the sustainability performance of organizations by incorporating various theories and frameworks. Applying these theoretical perspectives to HEIs shows the need for a holistic and integrated sustainability assessment. According to Stephens and Graham (2010), colleges may lead sustainability transitions in society. Thus, the theoretical framework for measuring HEI sustainability must recognize their position as catalysts for societal sustainability change, as well as organizations.

2.8 Organizational Life Cycle Sustainability Assessment Methods

Commonly, LCSA is always applied for a product to analyze the sustainability indicators of a particular product or process (Omran et al., 2021). However, there is no certain study found about the sustainability of an organization. Nevertheless, the O-LCA used for organizations considers the standard of ISO/TS 14072 (ISO, 2014).

In order to provide a more comprehensive and evaluative analysis of OLCSA methods, the following Table 2.2 presents a comparison of various approaches, emphasizing their advantages, limitations, and applicability of suitability to HEIs.

Table 2.2 : A comparison of various approaches of suitability to HEIs

Method	Strengths	Limitations	Applicability to HEIs	Adaptation for Afghan Context
O-LCA	Comprehensive ISO-compliant environmental impact assessment	Data-intensive; may miss organizational activity	Valuable for assessing the ecological impacts of campus activities	It can be streamlined to concentrate on crucial environmental indicators that are important to Afghan universities
LCC	Provide a comprehensive analysis of the economy over an extended period; assist in making informed decisions	Challenges in forecasting future costs; may not encompass all economic impacts	Beneficial for strategic financial planning in HEIs	Can be modified to prioritize the immediate and near-future costs resulting from economic uncertainties in Afghanistan

Table Continued : 2.2

SO-LCA	A comprehensive social impact assessment is conducted, taking into account the point of view and interests of different stakeholders	Subjective indicators pose a challenge when it comes to quantifying social repercussions	Crucial for assessing the social impacts and stakeholders' relationship	The program can be customized to prioritize significant social matters that are relevant to higher education in Afghanistan, such as promoting gender equality and community engagement

Although O-LCA is thorough, it might be difficult to use in regions with limited data availability, such as Afghanistan. Nevertheless, it is possible to modify the assessment by concentrating on crucial environmental indicators that are highly relevant and quantifiable in the specific context of Afghanistan, such as energy consumption and waste generation (Martínez-Blanco et al., 2015).

The implementation of LCC at Afghan HEIs could prove to be highly beneficial, although it may be necessary to modify the approach to prioritize shorter-term goals in consideration of economic uncertainty. It has the potential to assess the long-term financial viability of educational programs and infrastructure investments (Hoogmartens et al., 2014).

Furthermore, the utilization of SO-LCA holds significant promise in assessing the social impacts of Afghan universities. However, it may require customization to effectively address the specific social issues that are relevant to the country's higher education system, such as educational accessibility and gender equality (Martínez-Blanco et al., 2015).

Higher education institutions and universities are among the important organizations to produce graduates who will contribute to the communities as human capital. A limited number of articles were written about O-LCA, which reached 17 articles as a whole. The OLCSA, including O-LCA, LCC, and SO-LCA, is a vital decision-making tool for analyzing organizational sustainability in its entire lifespan. Therefore, the United Nations Environment Program/Society of Environment Toxicology and Chemistry (UNEP/SETAC) also developed the Guidance on Organizational Life Cycle Assessment in 2015, considering the ISO/TS 14072 standards. Nowadays, any organization can use O-LCA, SO-LCA, and LCC to estimate the sustainability of their organizations as a new framework of OLCSA.

Consequently, for analyzing organization sustainability, it is crucial to adopt available guidelines, namely the UNEP/SETAC 2015 Guidelines for the Organizational Life Cycle Assessment, the UNEP/SETAC Guidelines for the Methodological Sheets for Subcategories in Social Life Cycle Assessment, and the UNEP (2020) Guidelines for Social Life Cycle Assessment of Products and Organizations to analyze the social impacts and consideration related to organizations.

Organizational life cycle sustainability assessment methods, such as O-LCA, LCC, and SO-LCA, evaluate sustainability across an organization's lifespan. Critical analysis of these methodologies shows their strengths and weaknesses, which must be evaluated for higher education implementation.

2.8.1 Organizational Life Cycle Assessment (O-LCA)

Organizational life cycle assessment (O-LCA) is a relatively new concept gaining traction as a scientifically competent and practical approach (Martínez-Blanco et al., 2018). With the increased need for organizations to measure and analyze the environmental effects of their activities, O-LCA has recently been implemented from a life cycle viewpoint (Manzardo, Loss, Jingzheng, et al., 2018; Martínez-Blanco et al., 2018). The growing use of the O-LCA approach is relevant to LCA approaches (Manzardo et al., 2016).

Julia Martínez-Blanco et al., (2018) suggested that three main tasks should be taken in the future in their road-testing study: (1) the road-testing problems should be solved in the future by the LCA field; (2) methodological obstacles unique to particular types of organizations, such as the service industry, should be tackled; and (3) the organizational perspective's potential may be used in adjacent LCA areas. However, they explained that one of the limitations of OLCA in their study is that O-LCA may be unable to account for all activities occurring inside a city (Cremer et al., 2021).

Additionally, existing scientific and technological progressions show that the advantages of LCA might be applied to the environmental impact assessment of organizations, taking their operations and value chain into account (Martínez-Blanco & Finkbeiner, 2017). Furthermore, environmental life cycle assessment (E-LCA) and O-LCA are used alongside LCA, which was developed based on ISO/TS 14072.

Moreover, ISO/TS 14072 serves as the foundation for O-LCA, and the guidance is compliant with the standard (Martínez-Blanco, Inaba, Quiros, et al., 2015).

Consequently, there is no consensus found to use a specific method for OLCSA. Numerous studies used the Guidance on Organizational Life Cycle Assessment UNEP/SETAC 2015 guideline, which was developed considering ISO/TS 14072. Finally, Lo-Iacono-Ferreira et al. (2017a) made several recommendations in their study's conclusion. Thus, the O-LCA methodology is relevant to HEIs.

The Organizational Life Cycle Assessment (O-LCA) Guidance, which is aligned with ISO/TS 14072 (ISO, 2014), demonstrates the applicability of the technique and assists professionals in overcoming the methodological obstacles posed by transferring their focus from products to organizations (Martínez-Blanco et al., 2018). Even though the O-LCA study was used in HEIs by Lo-Iacono-Ferreira et al. (2017) with the environmental management system (EMS) combined, no study has been found about university O-LCA separately. Actually, universities and educational institutions are organizations; therefore, it is required to adopt O-LCSA the same way LCSA is adopted for products or processes.

The comprehensive approach of O-LCA in assessing an organization's environmental impact is its strength. However, it can struggle to capture all important actions, especially in complex organizations like universities with various operations (Cremer et al., 2021). In addition, O-LCA corresponds with ISO/TS 14072 standards, although a lack of consensus on its implementation can limit its effectiveness (Martínez-Blanco et al., 2018).

Organizations may analyze, compare, and demonstrate the environmental performance of their products, including commodities and services, using a variety of approaches, tools, and strategies (UNEP/SETAC, 2015). ISO 14001 (ISO., 2004) or its European equivalent, Eco-Management and Auditing the Environmental Management System (EMS), certified as a scheme, is a reference method for many businesses at the organizational level. They are mostly procedural tools, and when adding an organization eco-balance, they typically assess only gate-to-gate operations. The International Organization for Standardization created ISO/TS 14072 (ISO, 2014).

Most ISO 14044 (ISO, 2006) standards (27 out of 31) are fundamentally transferable from products to organizations. In addition, along with the creation of the standard document, the UNEP/SETAC Life Cycle Initiative launched the flagship project "LCA of Organizations," which evaluates the capabilities and applications of LCA to organizations (UNEP/SETAC, 2015).

According to ISO/TS 14072 (ISO, 2014), O-LCA gathers and evaluates the inputs, outputs, and potential environmental consequences of activities related to an organization adopting an LCA approach (ISO, 2014; UNEP/SETAC, 2015). Moreover, O-LCA is a life cycle method to tackle an organization's environmental footprint. The O-LCA technique identifies areas and measures environmental factors beyond the organization's boundaries while considering stakeholders' interests. It is an environmental impact strategy as it examines environmental concerns significant for an organization while also offering a prospective environmental impact profile of its operations (Lo-Iacono-Ferreira et al., 2017).

Specifically, ISO/TS 14072 (ISO, 2014) emphasizes identifying, assessing, and interpreting the potential of environmental factors affecting organizations (ISO., 2004). Even though O-LCA is still a relatively new concept, researchers and managers have been using an LCA perspective to measure businesses' environmental performance for some time now (Finkbeiner et al., 1999; Lo-Iacono-Ferreira et al., 2017).

Due to the diverse features of HEIs, modifications of the O-LCA framework are required. These changes may involve creating specific indicators that measure the social and educational effects of universities, as well as including the viewpoints of stakeholders to ensure a comprehensive assessment of sustainability (Lo-Iacono-Ferreira et al., 2017).

Another notable advantage is that O-LCA can be used to analyze an organization's environmental performance and benefits related to decision-making processes, as the technology can be utilized to generate necessary data. The provision of reporting advice and open policies are other essential advantages of O-LCA implementation (Lo-Iacono-Ferreira et al., 2017). Environmental impact profiles provide the necessary data to reveal environmental insights into an organization's decision-making process. UNEP/SETAC (UNEP/SETAC, 2015) and Martínez-blanco et al. (2015) have shown that O-LCA may be used to foresee scenarios and drive collecting data initiatives.

In conclusion, although the OLCSA method offers significant tools for assessing sustainability in higher education, additional study is required to enhance the application of this method. This involves tackling methodological obstacles and improving the frameworks to accurately represent the many roles of universities in promoting sustainable development.

2.8.2 Life Cycle Costing

The LCC analyzes the cost of products, services, or processes in the whole lifespan (Soni et al., 2016). Furthermore, LCC estimates the cost of all stages: risk, investment, operation, maintenance, and demolition (Sajid & Bicer, 2021). Finally, the LCC delivers potential facts about the total cost of the product, service, or process throughout the entire life cycle to assist the decision-making process (Liu et al., 2020). The LCC is enormously crucial for facilities management, especially for HEIs, universities, and schools, because those facilities have numerous buildings and related fittings (Kimoto et al., 2013). It is a widely used technique in different industries for economic assessment (Peña & Rovira-Val, 2020).

Life cycle costing is a decision-making tool to estimate the overall cost of a product or service throughout its entire life cycle from production to disposal. It is a methodology, which systematically estimates economic value throughout the approved scope. Furthermore, LCC is extensively considered as a cost-managing instrument (Zhang et al., 2019).

Life cycle costing aims to forecast cash flow and to give the assessment of choices for decision-makers. It contains four initial steps, which are the definition for analysis, problem analysis, conducting calculation, and result validations and interpretations (RICS, 2016). The UNEP published guidelines for LCC in 2009 and exemplified different methods in detail. Typically, LCC is used for valuing the cost to economically estimate the effectiveness of a product or process and advise the options; for example, to estimate the effective energy system or product based on its life cycle costs (Hoogmartens et al., 2014).

Although LCC provides essential insights into the economic dimensions of sustainability, it possesses both advantages and constraints. An advantageous aspect of LCC is its capacity to offer a thorough perspective of expenses over a period, facilitating more knowledgeable decision-making. On the other hand, LCC encounters difficulties in precisely forecasting forthcoming expenses, particularly in swiftly evolving economic circumstances. Moreover, the approach can be resource-intensive, necessitating significant allocation of resources for its implementation. The United States Department of Defense used LCC for the first time in 1933 for the maintenance and operations costs, and in 1981 for the procurement of military goods and equipment to calculate the total cost of products, considering the high costs of warfare equipment like tanks and fighter planes (Hoogmartens et al., 2014). It was established by the United States Department of Defense in the 1960s (Li et al., 2020). European countries have used the LCC method since the 1970s as a policy and business decision-making tool (Hoogmartens et al., 2014).

Life cycle costing is used to understand the entire life cost of a product and the monetary flow in a targeted product's life cycle. The essential cost is calculated, including the operational, maintenance, and end-of-life or disposal costs, to give decision-makers suitable options. Therefore, LCC is used continuously as a calculation tool to compare the options. Moreover, LCC defines ISO as “a technique which enables comparative cost assessments to be made over a specified time, taking into account all relevant economic factors both in terms of initial costs and future operational costs." Additionally, LCC has been defined in the ISO 15686 standard as "the cost of an asset or its parts throughout its life cycle, which comprises all stages from construction, operation, and maintenance to end-of-life." The LCC for buildings includes construction, maintenance, operation, and end-of-life costs (Li et al., 2020).

Life cycle costing in higher education has pros and cons. It can help determine the long-term financial effects of infrastructure investments, but it may not fully capture educational outcomes. Lozano et al. (2013) suggested that university's sustainability assessments should incorporate societal implications and also economic ones. Thus, LCC may need to be combined with other assessment methodologies in higher education to provide a more holistic view of sustainability.

Three different types of LCC are conventional life cycle costing, environmental life cycle costing, and societal life cycle costing. The E-LCC estimates the economic cost of a product or service concerning environmental conservation. It is used simultaneously with the LCA to focus on the environmental externalities cost to support sustainability (Śnierzyński Hernes, M., Bytniewski, A., Krzywonos, M., & Sobieska-Karpińska, J., 2019).

Azapagic et al. (2016) studied the three dimensions of sustainability (environmental, economic, and social aspects) for product sustainability. Rapid industrial growth causes environmental and ecological disorders. Sustainability is considered a priority in today's world. The ELCC is estimated as the direct and indirect costs of environmental damages in the entire life cycle of the product (Trigaux et al., 2017).

According to Kaewunruen, Sresakoolchai, & Peng (2020), LCC involves five steps: defining the objective, selecting parameters, collecting data, performing the assessment, and examining the results.

Additionally, Kimoto, Yoshizaki, and Ikeda (2013) explained that LCC can be delineated in three stages: (1) preliminary costs, which are the primary and initial expenditures; (2) yearly costs, which are the costs calculated for 12 months, considering that the yearly cost is the same every year; and (3) incidental costs, which are estimated in a periodic manner. Moreover, they calculated the education facilities based on the university outline, such as the ground area (m^2), floor area (m^2), number of teachers and staff, number of students, and number of buildings. Although the repainting and renovation cost was estimated in the maintenance cost, eventually, these elements and components were estimated separately for university buildings (Kimoto et al., 2013). Based on BS ISO 15686-5, Ayub & Abdul Rashid (2016) divided the LCC process into three main phases: input of the data, conversion, and output. Shan, Melina and Yang. (2018) calculated for the tutorial classroom in Singapore. Table 2.3 shows the components and elements of the education LCC, which comprehensively explains the education cost. Some of the authors calculated different elements and components based on their own nature of research.

Based on Table 2.3, in the context of higher education, there is no comprehensive method for calculating higher education LCC, which would have included all elements and components of higher education. Some elements calculated in other LCC studies for education facilities were determined, especially buildings, as the overall costs of higher education needed to be calculated. From Table 2.3, different articles focused on some components calculated in their studies, but there was no article that calculated all the components in higher education facilities and services. Future research should consider calculating the components and elements of higher education LCC other than those listed in Table 2.3, including risk mitigation, building safety and externalities, insurance and staff retirement, laboratory and chemical risks, and stationary costs.

Table 2.3 : Elements calculated for buildings, especially for education buildings in the literature

Element	Domain	Components Calculated	(Huang et al., 2018)	(Kimoto et al., 2013)	(Śnierzyński, et *al.*, 2019)	(Cuéllar-Franca & Azapagic, 2014)	(Li et al., 2020)	(Xu et al., 2017)	(Huang *et al.*, 2019)	(Bromilow & Pawsey, 1987)	(de Jong & Arkesteijn, 2014)	(Biolek et al., 2017)
Construction	Preconstruction	Plan and design		√					√	√		√
	Construction	Wages	√		√	√		√	√	√		√
		Transportation	√					√		√		
		Energy		√		√	√	√	√		√	√
		Raw materials		√				√	√	√		√
Operation	Maintenance	Maintenance										
		Renovation and replacement		√	√	√		√	√	√	√	√
		Labor cost		√		√	√			√		√
		Energy				√		√	√		√	
	Consumption	Water	√								√	√
		Electricity			√		√				√	
		Waste	√	√	√				√	√	√	
		Salaries	√		√		√			√		√

Table 2.3 : Continued

Demolition	Demolition	Demolition	√					√				
		Labor	√			√		√	√			
		Energy	√			√						
		Transportation							√			
		Recycling				√						
		Landfilling	√			√				√		
Safety and	Costs related to safety	Fire safety		√		√	√			√		
Externalities	Pollutions	Air pollution						√				
		Water pollution			√			√				
		Soil pollution						√				
Services	Staff cost	Salary			√		√			√		√
		Utility costs	√			√	√		√	√		
		Room service cost	√							√		√
	Laboratory costs	Laboratory fittings								√		
Student Costs	Facility costs	Tuition fee			√							
		Transportation		√								
		Communication				√						

2.8.3 Social Organizational Life Cycle Assessment

The first and precise definition (UNEP, 2020) of SO-LCA is "a compilation and evaluation of the social and socio-economic aspects and the positive and negative impacts of the activities associated with the organization as a whole or a portion thereof adopting a life cycle perspective." This assessment can be implemented in practice considering different levels of organizations' experience in social and environmental aspects (D'Eusanio et al., 2020; Martínez-blanco et al., 2015). The outline of S-LCA is generally used in SO-LCA impact assessment and interpretation (Kalvani et al., 2021; Martínez-blanco et al., 2015).

Social organizational life cycle assessment is required by describing how it helps in the resolution of S-LCA's main concerns. Moreover, SO-LCA is not thought to be a replacement for existing methods (Lo-Iacono-Ferreira et al., 2017). Impact assessment and interpretation of SO-LCA are primarily based on the S-LCA outline (Martínez-blanco et al., 2015). Higher education institutions and universities play a significant role in the transition toward socially, environmentally, and economically safe communities. The social aspect and the activity of higher education transformation are essential in addressing the complicated process of transition toward sustainable higher education systems and societies in general (Kapitulčinová et al., 2018).

Although SO-LCA provides a thorough structure for evaluating social effects on an organizational scale, it encounters many obstacles during its execution. The complexity of the procedure and the subjective nature of many social indicators can pose challenges in standardizing and comparing results across other organizations or sectors (Martínez-Blanco et al., 2015). Besides, SO-LCA poses distinct potential and challenges within the setting of HEIs. Universities, as influential social institutions, might greatly profit from a comprehensive social impact evaluation tool. Nevertheless, customizing the application of SO-LCA to the particular circumstances of higher education would necessitate the establishment of novel metrics that effectively measure the distinct social impacts of universities, such as the generation of knowledge, preservation of culture, and involvement in community activities (Lozano et al., 2013).

The social dimension is vital in sustainability assessment, especially for universities and HEIs, as social organizations provide social services. Social organizational life cycle assessment is defined as "a compilation and evaluation of the social and socio-economic aspects and the positive and negative impacts of the activities associated with the organization as a whole or a portion thereof adopting a life cycle perspective" (Martínez-blanco et al., 2015). Moreover, in the above-mentioned definition, an organization also has a huge amount of social negative and positive impacts on society and stakeholders. Therefore, conducting the SO-LCA as one of the important pillars of sustainability is necessary.

Social organizational life cycle assessment is composed of O-LCA using the UNEP/SETAC (UNEP/SETAC, 2013) and (UNEP, 2020) guidelines. The main methodological and practical challenges and limitations of S-LCA, resulting from the complexity of the social dimension, the novelty of the method, and the need for further development, are highlighted in the S-LCA guidelines (Martínez-blanco et al., 2015). There are only 8 indicators at the product level, 127 at the organizational level, and 69 at the national level in the current S-LCA method for the product (D'Eusanio et al., 2020; Martínez-blanco et al., 2015). The bulk of presently implemented S-LCA indicators are organizational-level in nature. Connecting social elements to a "reporting organization," the O-LCA and SO-LCA reference unit, appears more logical, relevant, and feasible (Martínez-blanco et al., 2015).

The organizational viewpoint of O-LCA and the O-LCA framework may be used to create the new SO-LCA method. This method may be used in practice regardless of an organization's level of experience with social and environmental assessment. Moreover, SO-LCA is not intended to replace current methods but to enhance them by broadening their scope (addressing the whole life cycle and including new social dimensions) and increasing their applicability (using an organizational instead of a product's perspective). The S-LCA guidelines emphasize the major methodological and practical difficulties and constraints of S-LCA, which arise from the complexity of the social component, the uniqueness of the technique, and the need for future development. Finally, there is a need to establish a more reliable and suitable method for assessing the social dimension of sustainability in an organization (Martínez-blanco et al., 2015).

2.9 Differences between Social Organizational Life Cycle Assessment and Social Life Cycle Assessment

Both SO-LCA and S-LCA are based on the LCT approach and have similar methodological underpinnings as described in the ISO 14040 series and the UNEP/SETAC Guidelines for Social Life Cycle Assessment of Products (Benoît et al., 2010). The same foundation enables a certain level of compatibility between the two approaches, while their disparities highlight the specific emphasis on organizations and products. The primary distinction between S-LCA and SO-LCA methodologies resides in the extent of the study, whether it focuses on the product or the organization. Table 2.4 provides specific distinctions between both methodologies. However, regarding the impact assessment and interpretation phase, there is no fundamental distinction between the two methodologies, and they face the same issues equally (UNEP, 2020).

Table 2.4 : Comparison of the differences between SO-LCA and S-LCA and corresponding difficulties

Phases	SO-LCA	S-LCA
Goal and Scope	Goal: To assess the social impacts of organizations Scope: Entities inside an organization or specific divisions of an organization The reference unit refers to the reporting organization, rather than a functional unit	Goal: To assess the social impacts of a product Scope: Products and services Definition of functional unit
Inventory	Required data: Organization-specific Challenge: Data from organizations continue to provide difficulties when it comes to providing data for stakeholder groups other than workers	Required data: Pertaining to a particular product. Challenge: Acquiring data at the level of individual products may pose difficulties
Impact Assessment	Focus: Assessing impacts at the organizational level Challenge: Establishing suitable impact categories and indicators that accurately represent the actions of a business and their wider societal impacts Method: Could utilize methods for assessing social impacts at the organizational level, strategies for engaging stakeholders, and metrics for measuring social performance	Focus: Assessing impacts related to products or services specifically Challenge: Linking the product-specific data to social impacts throughout the supply chain Method: Frequently use the impact categories based on the stockholders' groups, such as workers, consumers, and local community, as well as social topics, such as human rights and working conditions

The distinctions among SO-LCA and S-LCA have significant consequences for professionals and scholars. The organizational emphasis of SO-LCA may offer a more comprehensive perspective on social impacts, but it can also pose difficulties in gathering data and defining boundaries (Martínez-Blanco et al., 2015). On the other hand, the emphasis of S-LCA on product assessment enables more precise evaluations, but it may overlook wider organizational effects. These disparities emphasize the necessity for meticulous deliberation when deciding between the two approaches, based on the objectives of the evaluation and the resources at hand.

Although SO-LCA and S-LCA have significant advantages, they also have constraints related to the availability of data, impact assessment approaches, and stakeholder participation (Di Cesare et al., 2018). Subsequent analysis should prioritize the development of standardized indicators, improvement of data gathering methods, and examination of methods to incorporate these approaches with other instruments for assessing sustainability.

2.10 Existing Literature on Organizational Life Cycle Sustainability Assessment

Organizational life cycle sustainability assessment is a new approach adopted from (Klöpffer, 2008) the LCSA framework, which consists of LCA + LCC + S-LCA, and the O-LCSA approach can also comprise O-LCA + LCC + SO-LCA. There is no article found about OLCSA, although there are articles about O-LCA, SO-LCA, and LCC. The most relevant study is the O-LCA. ISO/TS 14072 (ISO, 2014) produced Requirements and Guidelines for Organizational Life Cycle Assessment, which is the first guideline for conducting O-LCA that is adapted from LCA, while the most useful guideline is UNEP/SETAC Guidance on Organizational Life Cycle Assessment (UNEP/SETAC, 2015), which focuses only on O-LCA and uses some case studies of O-LCA in their publication.

Martínez-Blanco et al. (2018) emphasized the necessity for future studies to focus on resolving issues related to road testing, overcoming methodological challenges specific to certain types of organizations, and investigating the possibilities of the organizational perspective in related areas of LCA. Additionally, the utilization of these approaches in HEIs has not been well investigated (Lo-Iacono-Ferreira et al., 2017).

Consequently, this study aims to fill these research gaps by creating a stronger and more tailored OLCSA method for HEIs. This study aims to promote the use of OLCSA as a comprehensive instrument for assessing organizational sustainability.

2.10.1 Literature of the O-LCA of Universities or Higher Education Institutions

Table 2.5 presents previous studies on O-LCA, where most of the authors used the guideline by (UNEP/SETAC, 2015) for assessing organization activities. However, there is no consensus on the use of the guideline, where some of the authors used the ISO/TS 14072 (ISO, 2014) guideline, which is based on the UNEP/SETAC O-LCA guideline (UNEP/SETAC, 2015).

Table 2.5 : Literature related to the O-LCA of HEIs

Authors	Objectives and Methods
(F et al., 2024)	Objective: To calculate the carbon emissions produced by a palm oil company's activities in the year 2030. Method: A unique approach was suggested, which involved the use of O-LCA, simple linear regression, and double exponential smoothing. Life cycle assessment was employed to determine the origins of emissions and quantify the quantity of emissions.
(Lau et al., 2024)	Objective: To evaluate the carbon footprint of the Erasmus University Medical Centre and to determine the key activities and sources contributing to the carbon footprint. Method: A hybrid approach combining life cycle impact assessment and expenditure-based methods was applied to quantify the hospital's 2021 carbon footprint across scopes 1, 2, and 3 of the greenhouse gas protocol, disaggregating results by purchases, medicines, product groups, and hospital departments.
(Harasymchuk et al., 2024)	Objective: To calculate the carbon footprint of the company Prague Water Supply and Sewerage, a water management organization in Central Europe. Method: A comprehensive LCA was used to evaluate the carbon footprint of the company.
(Elena Villalba-Pastrana & Patricia Güereca, 2024)	Objective: To assess the social performance of three textile micro, small, and medium-sized enterprises (MSMEs) in Ecuador using SO-LCA. Method: The framework for implementing SO-LCA in Ecuadorian textile MSMEs included goal and scope definition, inventory analysis through surveys and document reviews, performance assessment using reference scales, and analysis and interpretation of results visualized through sunburst charts.
(Cimprich & Young, 2023)	Objective: To conduct a thorough O-LCA of a 40-bed hospital in British Columbia, Canada, for its fiscal year of 2019. Method: The technique utilized in this study was based on the principles for assessing the life cycle of an organization.
(Notarnicola et al., 2023)	Objective: To describe the O-LCA methodological approaches that adhere to the ISO 14072 standard. Method: A wide-ranging commercial conglomerate was identified and mitigated.
(Cremer et al., 2022)	Objective: To examine the conditions under which a city might achieve low-emission autonomous vehicle mobility and to identify environmental obstacles. Method: A combination of city organizational life cycle assessment (city-OLCA) and autonomous vehicle transport models was utilized.
(Dantas et al., 2022)	Objective: To assess the sustainability and circularity performance of a zero-waste vegan restaurant in Brazil. Method: The methods employed included a combined circularity and O-LCA using circular transition indicators and waste hierarchy index, as well as scenario analysis to compare different restaurant operational situations.

Table 2.5 : Continued

(Alejandrino et al., 2022)	Objective: To assess the environmental and circularity efficiency of a certified zero-waste vegan restaurant in Brazil across several operational scenarios. Method: A comprehensive assessment integrating circularity and O-LCA was conducted by incorporating circular transition indicators and waste hierarchy index, in addition to scenario analysis.
(Dantas et al., 2022)	Objective: To assess the efficiency and applicability of O-LCA by integrating case studies and scientific literature debates. Method: The study employed a systematic literature review methodology, utilizing the STARR-LCA (Zumsteg et al., 2012) and PRISMA (Moher et al., 2009) models.
(Rimano et al., 2021)	Objective: To evaluate the ecological consequences of organizations, where a pilot test was carried out at a production site of a prominent plastic packaging industry. Method: The research, carried out between 2018 and 2019, adhered to the ISO 14044 and ISO/TS 14072 standards and utilized O-LCA methods to identify areas of significant environmental impact and provide information for corporate sustainability reporting.
(Junior et al., 2021)	Objective: To evaluate the O-LCA method and assess its suitability by examining case studies and conceptual discussions documented in scientific literature. Method: A systematic literature evaluation employing the STARR-LCA and PRISMA models examined 14 Scopus and Web of Science papers from 2012 to 2020.
(Cremer et al., 2021)	Objective: To assess the viability of a city using O-LCA, where a preliminary case study was conducted using actual urban data from Vienna. Method: In order to evaluate the environmental impact of a city, the O-LCA method was applied in a preliminary study utilizing actual data collected from Vienna.
(Büdel et al., 2020)	Objective: To manage organizational sustainability. One barrier is a limited perspective, while another is an absence of ideas and tools to integrate sustainability concerns into routine operations. Method: O-LCA guidelines
(Cremer et al., 2020)	Objective: To create environmentally friendly solutions while fulfilling their obligation to establish the foundation for a prosperous society. Method: A novel approach for conducting LCA at the city scale was proposed by expanding the current methodological discussion to incorporate O-LCA.
(Marx et al., 2020)	Objective: To identify and mitigate the specific impacts and focal points of each situation without transferring the load elsewhere. Method: O-LCA was implemented in a small and medium-sized enterprise in the solar and wind energy sectors in the United Kingdom.
(Forin, Gossmann, et al., 2020)	Objective: To systematically collect data on water footprint at the organizational level through the implementation of ISO 14046 and ISO/TS 14072. Method: A case study.

Table 2.5 : Continued

(Forin, Mikosch, et al., 2020)	Objective: To analyze the water footprint of an organization. Method: ISO 14046 (water footprint) and ISO/TS 14072 (OLCA) were compared.
(Fritsch, 2020)	Objective: To create a life cycle-based perspective and integrate an O-LCA modeling technique for sustainable business process Management. Method: The two guiding principles are business process focus and a life cycle viewpoint.
(Martínez-Blanco et al., 2019)	Objective: To investigate difficulties in order to provide practitioners with lessons learned for future applications and to aid in future technique development efforts. Method: The paper focused on obstacles unique to the organizational approach; in addition, certain additional issues common to product LCA but amplified in organizational LCA were also addressed.
(Forin et al., 2019)	Objective: To facilitate the UNEP/SETAC Guidance on O-LCA implementation. Method: An anonymous survey was conducted among the road testers to gather feedback on the application procedure.
(Manzardo, Loss, Jingzheng, et al., 2018)	Objective: To develop a tourist hamlet in Italy in line with OLCA. Method: Requirements of ISO/TS 14072 and UNEP.
(Martínez-Blanco et al., 2018)	Objective: To review the flagship project phases. Method: The Guidance on O-LCA was published. The flagship project accompanied 12 organizations in the road testing of that OLCA Guidance.
(Manzardo, Loss, Niero, et al., 2018)	Objective: To conduct O-LCA for a multisite beverage business and also a product LCA. Method: Comparison of O-LCA and LCA.
(Lo-Iacono-Ferreira et al., 2017)	Objective: To analyze the suitability of O-LCA for HEIs. Method: ISO/TS 14072 and UNEP guideline at the Universitat Politècnica de València (UPV) EMS.
(Manzardo et al., 2016)	Objective: To highlight the difficulties of using O-LCA for the packaging industry. Method: The ISO/TS 14072 guideline.
(Resta et al., 2016)	Objective: To use O-LCA in decision-making in the textile industry. Method: O-LCA
(Martínez-Blanco, Inaba, & Finkbeiner, 2015)	Objective: To introduce ISO/TS 14072 with several developed initiatives. Method: The resulting methodology is the so-called O-LCA, introduced by ISO/TS 14072.
(Reyes et al., 2011)	Objective: To introduce the O-LCA approach for the textile industry. Method: O-LCA was used for the study of literature and semi-structural interviews in six textile businesses.

Table 2.5 presents literature related to the topic of O-LCA. Most of the literature employed the UNEP/SETAC (2015) guidelines to evaluate organizational activities. Nevertheless, there is a lack of agreement over the adoption of a singular guideline. Certain researchers have opted to utilize the ISO/TS 14072 (ISO, 2014) guideline, which serves as the foundation for the UNEP/SETAC O-LCA recommendations (UNEP/SETAC, 2015).

Although the UNEP/SETAC (2015) recommendations are commonly utilized, the absence of agreement on a singular guideline suggests that there is variation in the implementation of O-LCA. The heterogeneity in data might result in discrepancies in findings and difficulties in comparing research conducted by various institutions (Martínez-Blanco et al., 2015). Furthermore, the utilization of O-LCA in HEIs is currently restricted, as the majority of studies concentrate on other industries (Lo-Iacono-Ferreira et al., 2017).

Although these studies provide vital insights into the use of O-LCA in different contexts, there is still a notable lack of information regarding how these methodologies can be applied in post-conflict, resource-limited higher education settings, such as Afghanistan. This study aims to fill this gap by modifying the O-LCA method to suit the specific obstacles encountered by Afghan institutions, notably in terms of data collection and analysis in a resource-limited context.

2.10.2 Literature of the SO-LCA of Higher Education Institutions

Social organizational life cycle assessment is a promising methodology for assessing the level of social happiness within an organization. Consequently, there is a scarcity of research publications available on this topic in the literature. A comprehensive literature review of articles related to SO-LCA is provided in Table 2.6.

Table 2.6 : Literature related to SO-LCA

Authors	Objective and Methods
(Sigcha et al., 2024)	Objective: To assess the social effects of MSMEs in the Ecuadorian textile industry using SO-LCA. Method: SO-LCA was applied to three case studies, using 121 inventory indicators connected to worker and consumer subcategories.
(Sining et al., 2022)	Objective: To assess and examine the possible social consequences that may influence the overall social welfare within a university atmosphere. Method: The study employed the SO-LCA methodology, following the requirements outlined in ISO 14040 and ISO 14044. A survey was conducted at a university in Malaysia.
(D'Eusanio et al., 2022a)	Objective: To analyze the working conditions of a wine-producing company using SO-LCA, specifically focusing on the evaluation of SA8000 standards. Method: The SO-LCA case study was performed on a consortium comprising nine cooperative wineries located in Chieti, Abruzzo, a region in Central Italy.
(D'Eusanio et al., 2022b)	Objective: To apply the SO-LCA methodology and to examine the connections between S-LCA and SO-LCA in order to gain a deeper comprehension of their similarities and distinctions. Method: The study compared SO-LCA and S-LCA outcomes, ensuring that the conditions were consistent. The purpose of this comparison was to examine the emerging correlations and methodological peculiarities.
(Osorio-Tejada et al., 2022)	Objective: To evaluate the social performance of enterprises engaged in the supply chain of road transport across different worldwide settings by employing the SO-LCA methodology. Method: SO-LCA was conducted on freight businesses in Colombia, Spain, and Malaysia, following the rules set by UNEP/SETAC. This evaluation involved analyzing 26 different subcategories of social impact and using reference scale assessments to calculate social performance indices.
(Bueno et al., 2022)	Objective: To execute the O-LCA and SO-LCA methodology for the University of the Basque Country (UPV/EHU). Method: The process involved measuring the life cycle inventory (LCI) and analyzing the environmental and social footprints using Ecoinvent 3.3 and PSILCA-based Soca v1 models implemented in the OpenLCA software.
(Bueno et al., 2021)	Objective: To utilize the SO-LCA methodology to examine the wine supply chain and evaluate organizational factors by incorporating SA8000 data. Method: The SO-LCA methodology was developed and used according to ISO standards, with a specific emphasis on a group of collaborative wineries in Chieti, Abruzzo. In addition, SA8000 data were utilized to gain valuable insights into the working environment.

Table 2.6 : Continued

(García-Muiña et al., 2021)	Objective: To address the gaps in social sustainability research in the manufacturing industry by combining the use of SO-LCA and Industry 4.0 to continuously monitor and evaluate social performance. Method: Specialized social indicators were created to evaluate the social effects of manufacturing, with a focus on key metrics that are important for progressing toward a circular economy (CE) through digital transformation.
(Erauskin-Tolosa et al., 2021)	Objective: To estimate an HEI's social footprint and potential SDG contribution via LCA. Method: SO-LCA was performed on the academic activities at the University of the Basque Country (UPV/EHU) in northern Spain to measure and assess its social effects.
(D'Eusanio et al., 2020)	Objective: To identify and incorporate the critical social issues of a sector or organization into the SO-LCA framework. Method: The Pugh matrix was utilized to assess social concerns and stakeholder types as per the Guidelines for Social LCA UNEP/SETAC.
(Zanchi et al., 2018)	Objective: To conduct a thorough analysis and create a systematic method for establishing S-LCA studies, with a specific emphasis on defining the objectives and scope, as well as the inventory stages, in the automobile industry. Method: An extensive examination and evaluation was performed on the crucial factors affecting the goals and scope definition, as well as the inventory stages of S-LCA.
(Benoît Norris & Revéret, 2015)	Objective: To provide a structured approach for carrying out S-LCA investigations, with a specific focus on determining the goals, extent, and inventory phases in the automotive sector. Method: A thorough analysis and assessment was performed on the key aspects affecting the determination of goals and scope, as well as the inventory stages of S-LCA in the context of the automotive industry.
(Martínez-blanco et al., 2015)	Objective: To lay the ground for the progress, improvement, and dissemination of a life cycle-based social assessment. Method: Two fundamental approaches, namely the recommendations for S-LCA of products and the guidance on O-LCA, were applied.

Table 2.6 presents the SO-LCA, a recently developed approach for evaluating the social impacts of organizations. This method is an alternative to the UNEP/SETAC 2013 guideline (UNEP/SETAC, 2013), which is typically used for assessing the social impacts of products. Additionally, there are limited studies about SO-LCA in the literature; therefore, the UNEP (UNEP et al., 2020) developed an updated guideline entitled Guidelines for Social Life Cycle Assessment of Products and Organizations.

Although SO-LCA has the potential to provide valuable insights into the social effects of organizations, its implementation in HEIs is still lacking. Implementing social impacts is challenging due to their complexity and the absence of defined metrics (Macombe et al., 2013). Moreover, the incorporation of SO-LCA into the OLCSA framework necessitates meticulous deliberation of system limits and impact categories to prevent redundancy and guarantee a thorough examination of sustainability factors (Martínez-Blanco et al., 2015).

Although SO-LCA has the potential to provide useful insights into the social impacts of organizations, its adoption in HEIs, particularly in developing countries, is still in the early stages. This study aims to address this deficiency by creating and implementing a specialized SO-LCA framework that is customized to the unique socio-economic circumstances of Afghan universities. This framework will take into account various problems, including gender equality, community engagement, and post-conflict reconciliation.

2.10.3 Literature on the LCC of Higher Education Institutions or Universities

Life cycle costing is a long-standing method used to estimate the total costs of a product or process across its entire lifespan, taking into account environmental externalities. This aspect of OLCSA is well-supported by extensive research and several articles available in the literature. The comprehensive literature review table of the article relevant to LCC is presented in Table 2.7.

Table 2.7 : Literature related to LCC approaches

Authors	Objectives and Methods
(Ozawa & Kudoh, 2024)	Objective: To estimate the 2030 hydrogen supply chain's LCC and O_2 emissions in Japan. Method: LCC and O_2 for different energy carriers were calculated using the LCI database and the way power inputs affect these parameters was investigated.
(Alasmari et al., 2024)	Objective: To examine the ways in which LCC and the implementation of the CE can be improved by building information modeling (BIM). Method: Fifty recent publications were examined to learn about the challenges in CE, possible solutions, and the use of BIM in material management and sustainable design for circular construction.
(Hromada et al., 2024)	Objective: To assess the strategic application of life cycle cost analyses (LCCAs) in the administration and preservation of heritage properties, with a specific emphasis on enhancing the sustainability and efficacy of restoration methods. Method: Dynamic LCC methodologies, such as MONUREV software V2, were used to simulate restoration scenarios and undertake case studies on Czech heritage structures.
(Tsegai et al., 2024)	Objective: To examine why LCC approaches are not widely used in the Nairobi County's building industry despite accessible methods. Method: Descriptive statistics, correlation analyses, analysis of variance, regression analysis, and confirmatory factor analysis were utilized to investigate the influence of different factors on the level of LCC adoption.
(Chakravorti, 2024)	Objective: To introduce and explain a simple, creative model for Life Cycle Cost Analysis (LCCA) as well as a unique methodology for calculating the changing worth of money over time. Method: LCCA was used as an economic decision-making instrument, highlighting its ability to synchronize functional conflicts inside organizations through the use of facts, money, and time.
(Camille et al., 2024)	Objective: To compare the cost-effectiveness of employing traditional railway sleepers with those made of macro-synthetic fiber-reinforced concrete (MSFRC). Approach: Future market values were modeled by changing important economic parameters, and the purchase, operation and maintenance, and end-of-life costs of conventional and MSFRC sleeper materials were compared using an LCC methodology.
(Casella et al., 2024)	Objective: To examine the LCC of food technology, with a specific emphasis on a milling plant, and to create an analytical model to measure the primary cost elements. Method: Microsoft Excel™ was utilized to create a comprehensive analytical model for determining the initial purchase costs, operating expenses, maintenance costs, and end-of-life costs of a milling facility. The focus was on providing a detailed breakdown of the operating cost component.
(Iyer et al., 2023)	Objective: To evaluate the life cycle expenses associated with welded joints, with a specific emphasis on the influence of post-weld treatments, such as high-frequency mechanical impact (HFMI), on fatigue life and total costs. Method: The effective notch stress method was used to examine the fatigue life of welds, implement automated HFMI treatment, and assess the influence of weld quality on production expenses to determine the overall effect on LCC.

Table 2.7 : Continued

(Gulcimen et al., 2023)	Objective: To assess the sustainability of Abdullah Gul University's Sumer Campus and to create a model that integrates ELCA, LCC, and S-LCA for thorough analysis. Method: EUse E-LCA was used to measure global warming potential and cumulative energy demand, LCC was utilized to examine costs, focusing on energy expenses, and S-LCA was employed to evaluate campus social performance across local community, consumer, worker, and societal factors.
(Ngabire et al., 2023)	Objective: To create a prognostic budgeting approach for the upkeep of bridge infrastructure in Canadian communities. Method: Historical evaluations of the bridge's conditions were used to establish matrices that indicate the extent of deterioration and the effects of maintenance. An algorithm based on the principles of Markov chains was employed to model the bridge's conditions over a span of 20 years. The maintenance plan that incurred the least LCC was determined, hence enabling accurate prediction of future budgetary needs.
(Zeng et al., 2023)	Objective: To determine the economic lifespan of transmission lines by taking into account all expenditures incurred over their entire life cycle. Method: Mathematical models were created for calculations, an enhanced GM (1,1) method was employed for prediction, and an interval cost model was suggested for estimating economic lifespans.
(Oruwari & Ogbuike, 2023)	Objective: To investigate the relationship between project LCC and the sustainability of natural gas pipeline projects in Nigeria. Method: Literature review, document analysis, and case studies were conducted utilizing descriptive and explanatory research approaches, with an emphasis on Nigerian gas pipelines for power production and other applications.
(Petrillo et al., 2023)	Objective: To contribute to the creation of a complete study on the LCCA of hydrogen energy systems and to present a simple framework for integrated analysis. Method: Various outcomes were assessed, the economic data for hydrogen technologies were balanced, and an "ABC" analytical framework based on the LCC method and multicriteria decision analysis was created.
(Kerdlap et al., 2023)	Objective: To evaluate the economic efficiency of small-scale dispersed systems against large-scale centralized systems for the sorting and recycling of plastic trash in Singapore. Method: A combination of LCC and hybrid simulation modeling was utilized to evaluate the NPV of various plastic recycling systems over a period of 7 years.
(Rathore et al., 2022)	Objective: To evaluate and analyze the total expenses incurred over the whole life cycle of four different wastewater treatment technologies (activated sludge processes, BioFOR, upflow anaerobic sludge blanket, and moving bed biofilm reactor) in India using the LCCA methodology. Method: The present value technique was utilized to calculate the discounted costs for a 20-year economic lifespan. This involved taking into account various expenses, such as capital, annual operation, energy, salvage, and replacement costs for each technology.

Table 2.7 : Continued

(Najjar et al., 2022)	Objective: To evaluate the ecological consequences and financial implications of desalination facilities operated by various combinations of renewable energy sources and power grids. Method: A comprehensive evaluation was conducted on the environmental impact and initial cost of integrating photovoltaic-grid, wind-grid, and anaerobic digestion-grid energy systems into saltwater desalination plants.
(Gavaldà et al., 2022)	Objective: To create and demonstrate an innovative LCC modeling toolbox for biomass-based processing route's electrical and thermal energy costs. Method: Existing toolkits were reviewed, a new LCC toolkit was constructed, and case studies and sensitivity analysis were used to compare bioenergy and business-as-usual levelized cost of electricity in Sub-Saharan African commercial sectors.
(Alejandrino et al., 2022)	Objective: To develop and use an organizational-level CE strategy evaluation and prioritization technique based on environmental and economic performance (eco-efficiency). Method: O-LCA and O-LCC were combined and applied in a case study of an industrial organization making construction products, and ten CE improvement options in eight alternative scenarios were evaluated.
(Rafiq et al., 2021)	Objective: To evaluate the economic and environmental consequences of including 20% recycled asphalt pavement in pavement construction and maintenance, as opposed to utilizing standard hot mix asphalt. Method: A case study was conducted to compare recycled asphalt pavement and traditional hot mix asphalt in terms of LCC, manufacturing plant costs, and carbon dioxide emissions, with a focus on material-related costs and local climate conditions.
(Furch & Koneþný, 2021)	Objective: To elucidate the fundamental principles of LCCA, underscore its significance in quality management, and offer assistance in performing LCCA. Method: The products and needs were defined, LCC principles were explained, two fundamental calculation methodologies were provided, and a ten-step procedure was designed for a thorough product LCCS.
(Sasongko & Pertiwi, 2021)	To assess the total costs associated with the manufacturing of palm oil biodiesel throughout its life cycle by considering any external factors. Approach: LCCA was utilized in three specific phases of production (fresh fruit bunch, crude palm oil, and biodiesel) by integrating factors like land use, social impacts, and environmental costs.
(Bixler et al., 2020)	Objective: To evaluate the economic and social feasibility of plasma gasification as a technique for converting trash into energy. Method: A comprehensive importance-fulfilment matrix integrating environmental, technical, economic, and social elements was created and utilized. Subsequently, a sensitivity analysis was conducted on critical economic components.
(Kambanou & Sakao, 2020)	Objective: To provide a pragmatic framework utilizing LCC to assist firms in the selection and implementation of CE strategies. Method: LCC was performed at three different case companies, and the procedures and decision criteria employed by these companies were evaluated.

Table 2.7 : Continued

(Kerdlap & Cornago, 2020)	Objective: To introduce LCC to quantify CE products, services, and activities regarding economic performance. Method: LCC concepts were discussed, a step-by-step technique for traditional LCC was described, two case studies were provided, and the LCC and LCA were discussed.
(Kambanou, 2020)	Objective: To analyze how a manufacturing organization implements LCC and to assess its impact on life cycle management (LCM). Method: LCC in a manufacturing organization was prescribed, adoption and methodological choices were examined, and the LCM effects were analyzed.
(Whyte & Scott, 2019)	Objective: To provide an integrated LCCA methodology for building and engineering component design. Method: A building design LCC system was created by identifying contributory elements and sub-elements using statistical, probabilistic, fuzzy logic, artificial neural network, and object-oriented analytic tools.
(Cicconi et al., 2019)	Objective: To compare lithium-titanium oxide batteries with lead-acid batteries. Method: A method was developed to analyze the battery's total cost of ownership, energy consumption was simulated to anticipate battery cycles and operation costs, and a compacted lithium-titanium oxide battery was compared to a lead-acid battery in an industrial setting.
(Śnierzyński et al., 2019)	Objective: To utilize ELCC in network organizations. Method: E-LCC was used.
(Mustafa & Elitas, 2019)	Objective: To explain LCC and how it supports sustainability by considering costs across a product's life cycle. Method: LCC's essential components were presented and compared to conventional costing systems, and the impact on waste management and sustainability was evaluated.
(van den Boomen et al., 2018)	Objective: To create a novel LCC methodology. Method: A stepwise process was developed for age replacement and interval replacement models using three LCC techniques.
(Rödger et al., 2017)	Objective: To introduce LCC and how it can be used to support decision-making. Method: The concepts and prices were defined, and the major cost categories were considered from the viewpoints of various users.
(Miah et al., 2017)	Objective: To improve integrated LCA and LCC. Method: A hybridized framework was integrated with environmental and economic research.
(Sánchez Trujillano & Perelli Botello, 2016)	Objective: To discuss the novel use of LCC for bid evaluation in European Union public procurement, particularly in construction and roads. Method: The inclusion of LCC in the European Public Procurement Directives, was discussed, in addition to existing LCC techniques and tools.
(Vieira & Bravo, 2016)	Objective: To develop an LCC model to assess the ownership cost of an environmentally framed aircraft wing. Method: An LCC model was created for an actual aircraft wing eco-demonstrator, the costs were analyzed, and the financial viability of green materials for aeronautical constructions was assessed.
(Martinez-Sanchez et al., 2016)	Objective: To compare a food waste management method against others, such as conversion to animal feed or energy. Method: Societal LCC was used in the study.

Table 2.7 : Continued

(Navarro Galera et al., 2016)	Objective: To identify changes needed to apply LCC in the Spanish Armed Forces' economic evaluation systems. Method: The Spanish Armed Forces' economic systems to LCC norms were assessed and then compared with European and American systems, and improvements based on empirical research strengths and weaknesses were proposed.
(Martinez-Sanchez et al., 2015)	Objective: To create an LCC-based cost model for the economic assessment of a solid waste management system. Method: The model was used in case studies to compare segregation and incineration of organic waste sources.
(Ciroth et al., 2015)	Objective: To assess all costs of large-scale assets. Method: A case study for a combined heat and power plant was used for E-LCC.
(Moreau & Weidema, 2015)	Objective: To promote the LCC common matrix-based method. Method: The LCC was derived from physical and monetary technology matrices by employing a simple and fictional scenario.
(Hall, 2015)	Objective: To review the use of economic values in LCA and the justification for E-LCC. Method: A transdisciplinary review of economic values in LCA was carried out.
(Higham et al., 2015)	Objective: To determine LCC utilization as an early-stage project appraisal tool in the UK construction industry. Method: UK construction professionals were surveyed and semi-structured interviews were conducted to determine LCC utilization criteria.
(Conroy & Bil, 2014)	Objective: To compare liquid methane to Jet-A fuel for economic viability as a sustainable aviation fuel alternative. Method: A proposed liquid methane aircraft was compared to a current comparator aircraft based on annual fuel, aircraft acquisition, and airport infrastructure expenses in a modified preliminary LCC analysis.
(Cuéllar-Franca & Azapagic, 2014)	Objective: To calculate the total expenses for the whole lifespan of the housing stock in the UK for the purpose of evaluating its sustainability. Method: The LCC for different types of houses was determined, the findings were extended to a national scale, and a concise evaluation of the environmental consequences was provided.
(Schau et al., 2012)	Objective: To present the results of a product's sustainability evaluation. Method: ISO 14040 and 14044.
(Moore & Morrissey, 2014)	Objective: To evaluate the influence of fundamental assumptions in LCC analysis on the Zero Energy Home program in Victoria, Australia. Approach: The impact of modifications on the assumptions of LCC parameters and the policy implications for minimum energy efficiency standards were analyzed.
(Safi et al., 2013)	Objective: To illustrate the Swedish Bridge and Tunnel Management System (BaTMan) by integrating LCC. Method: BaTMan's LCC analysis tools were used in a case study with cost records from 2,508 bridges to demonstrate its use in bridge maintenance or replacement choices.
(Theregowda et al., 2013)	Objective: To compare the LCC of tertiary treatment methods for treating municipal wastewater for reuse in power plant cooling systems. Method: A life cycle conceptual costing tool that estimated costs within 15–40% accuracy for various treatment solutions was developed.

Table 2.7 : Continued

(Moser et al., 2012)	Objective: To complement manufacturing process management with product LCM using LCC techniques. Method: The early design decision support incorporated activity-based costing (ABC) and case-based reasoning techniques.
(Samarakoon et al., 2012)	Objective: To utilize LCC to select the best accessible and qualified technique among technically viable options. Method: An industrial case study was conducted in the early stages of a project by evaluating two alternatives.
(Sacks et al., 2012)	Objective: To compare heat recovery ventilation technology to a direct expansion ducted system in a South African green building for cost analysis. Method: A 20-year 10-step LCCA was performed at Lincoln on the Lake in KwaZulu-Natal, South Africa.
(Klöpffer & Ciroth, 2011)	Objective: To advocate for the incorporation of LCC into the assessment of product systems' sustainability based on their life cycle. Method: The sustainability's history was examined, and an LCSA framework that incorporated environmental LCA, ELCC, and S-LCA was proposed.
(Schau et al., 2011)	Objective: To study the use of LCC in a sustainability evaluation that included LCC, S-LCA, and LCA. Method: LCC was used to evaluate three design choices and three plant sites for remanufactured alternators.
(Swarr et al., 2011)	Objective: To develop a code of practice for LCC. Method: LCC was used in the study.
(Waghmode et al., 2010)	Objective: To demonstrate a way to evaluate the expenses of a pump's whole life cycle using an ABC approach. Method: LCC analysis was carried out using ABC and subsequently applied to two pumps from an Indian pump manufacturer.
(Gorbea et al., 2010)	Objective: To compare hybrid electric vehicle architectures with different electrification levels to a conventional car using an LCC model. Method: Create and apply An LCC model for 2015–2024 scenarios was created and applied to compare hybrid and conventional vehicles in terms of cost and sensitivity.

The LCC is the most useful method for estimating the whole cost of a product in its lifespan, whereas the E-LCC is used for product LCA, including environmental externalities. Furthermore, E-LCC was used in the some above-mentioned studies for estimating the whole cost of a product, including environmental externalities. A total of 29 studies related to E-LCC were found in the literature, with most of the articles published in the last three years.

Although LCC is commonly employed to calculate the overall cost of a product over its lifespan, the inclusion of environmental externalities using E-LCC introduces additional intricacy. Besides, E-LCC is employed in conjunction with LCA to consider environmental externalities, thereby offering a more all-encompassing perspective on sustainability (Hoogmartens et al., 2014). Nevertheless, integrating LCC in the OLCSA framework poses methodological difficulties, including the need to prevent duplicate counting of impacts and to maintain consistency across several evaluation variables (Swarr et al., 2011).

Although LCC is widely utilized in various sectors, its implementation in HEIs in developing countries, especially those in post-conflict contexts, is limited. This study aims to fill this gap by modifying LCC approaches to suit the distinctive economic concerns encountered by Afghan universities, such as limited financial resources, unpredictable funding, and the requirement for long-term financial viability in an uncertain setting.

Life cycle sustainability assessment is a complex approach that is adopted in this study to estimate the OLCSA using the three pillars of sustainable development. First, the environmental impact was analyzed in the O-LCA of the organization using the UNEP/SETAC (UNEP/SETAC, 2015) guideline, and the social impacts were evaluated using the UNEP/SETAC (2013)(UNEP/SETAC, 2013) guideline, in line with the UNEP/SETAC guideline (UNEP/SETAC, 2015) of OLCA. Furthermore, for assessing the economic pillar, the E-LCC was used for estimating the whole cost of the organization with externalities. Nevertheless, there is no consensus about the method to be used for costing. Additionally, no study has been found about the OLCSA of an organization, especially for a university or HEI.

In conclusion, although OLCSA methods have been utilized in many situations, there is a noticeable lack of their implementation in HEIs in post-conflict countries and resource-limited environments, such as Afghanistan. This study aims to fill these knowledge gaps by creating a unified OLCSA framework that integrates customized O-LCA, SO-LCA, and LCC approaches to offer a thorough sustainability assessment of Kabul University. This research will contribute to the overall comprehension of sustainability assessment in a complex and challenging context and provide significant perspectives for policymakers and university administrators facing similar settings.

2.11 Conclusions

This chapter provides a concise introduction to the fundamental and methodological concepts of three assessment methods: O-LCA), LCC, and SO-LCA. A comprehensive evaluation of the current status of OLCSA development was carried out, with a specific emphasis on its implementation and difficulties. The methodology is based on LCT and follows ISO standards, namely ISO 14040 and ISO 14044. Furthermore, OLCSA provides a comprehensive approach to evaluating sustainability that goes beyond just focusing on products. This allows companies to examine their whole effect and make well-informed decisions. Although O-LCA and SO-LCA have become more popular, there is still a requirement for additional progress and uniformity, particularly in the fields of social impact assessment and costing methodologies.

Based on the critical reflection of the current state of knowledge, it becomes evident that there are several significant controversies and areas of agreement on the subject of OLCSA. Although there is a consensus on the significance of incorporating environmental, social, and economic factors in assessing organizational sustainability, there are ongoing obstacles in the methods used, particularly in assessing social impact and determining costs. The absence of uniform indicators and methodologies for gathering data across all types of organizations, particularly in the service industry, continues to be a major obstacle.

This literature study highlights substantial deficiencies in comprehending the implementation of OLCSA in higher education settings following post-conflict countries. There is a lack of thorough research that integrates the O-LCA, SO-LCA, and LCC in limited-resource settings, such as Afghanistan's higher education sector. This study aims to fill these knowledge gaps by creating a customized OLCSA framework specifically designed for Kabul University. This framework will improve both the theoretical comprehension and practical implementation of OLCSA in complex environments. Moreover, this approach modifies existing methods to accommodate data constraints and distinctive social aspects in post-conflict settings, thereby extending the applicability of OLCSA beyond its current scope. In addition, this study adds to the existing research on sustainability assessment in developing countries by specifically examining an HEI in such context.

Applying OLCSA to HEIs and universities is especially pertinent due to its substantial influence on the development of sustainable societies and intricate organizational frameworks. The OLCSA emphasizes the incorporation of stakeholders' viewpoints and the evaluation of both favorable and unfavorable consequences, which are fundamental components in line with wider sustainability objectives and conscientious resource administration. In the future, there are various obstacles and possibilities that lie ahead. Additional development of techniques, particularly for SO-LCA and organizational LCC, is necessary to enhance the uniformity and comparability of research findings. The widespread implementation of OLCSA by many firms, particularly those in the service industry, will serve to validate and enhance the technique. Creating industry-specific recommendations and indicators could improve the usefulness and significance of OLCSA for various sectors. As organizations remain pivotal in the attainment of SDGs, OLCSA presents a promising framework for evaluating and enhancing their sustainability performance. This is because OLCSA can help firms achieve sustainable practices and contribute to the overall objectives of sustainable development by addressing environmental, social, and economic aspects simultaneously. By applying OLCSA to genuine case studies, the aforementioned hurdles can be addressed and viable solutions to the issues associated with OLCSA implementation can be proposed. Nevertheless, as sustainability is universally acknowledged as a fundamental principle, it is imperative to understand the comprehensive evaluation of organizational life cycle sustainability in order to present stakeholders with a thorough awareness of the issue. Subsequently, appropriate decisions may be made. It is crucial to build a precise and standardized language to harmonize the three life cycle methodologies and disciplines in order to effectively tackle the issues associated with OLCSA. In order for OLCSA to have a measurable impact on the sustainable development of our society, it must first be established as both legitimate and applicable.

CHAPTER 3

METHODOLOGY

3.1 Site Selection

Kabul University is the primary focus of this study. The large student population, diverse faculties, and established facilities of Kabul University, the oldest and largest university in Afghanistan, serve as a significant case study for higher education system in the country (Mussawy & Rossman, 2021). A study of Kabul University provides the opportunity to identify the challenges and opportunities for sustainability in a higher education institution in a resource-limited, and poor countries settings. The map of Kabul University, as illustrated in Figure 3.1, define the university's general boundaries, which encompass faculties, dormitories, the library, the main administrative structure, and the central laboratory.

Kabul University is located in the 3rd district of Kabul. It covers an area of 143,379 square feet (13,320.3 m^2). Kabul University was established in 1932, as one of the oldest and most prestigious higher education institutions (HEIs) in Afghanistan. Furthermore, it comprises 20 faculties and 103 departments. The present enrollment is at 24,633 students, with approximately 889 faculty members teaching at Kabul University.

Kabul University occupies a prominent role in Afghanistan's higher education system. Being one of Afghanistan's largest and most well-established universities, it has a significant impact on molding the academic and professional environment of the country (Mussawy & Rossman, 2021).Compared to other HEIs in Afghanistan, Kabul

University distinguishes itself from other HEIs via its extensive range of academic programs and its crucial role in the country's educational development. With a student enrollment of 24,633 and a faculty count of 889, it surpasses comparable universities. The Figure 3.1 demonstrates the Kabul University areas.

Figure 3.1 : A map of Kabul University

Finally, this study focuses on the challenges of conducting sustainability research in a developing, post-conflict country by using Kabul University as a case study. This encompasses the assessment of how the institution addresses challenges pertaining to the management of resources, the involvement of stakeholders, and the incorporation of sustainability into its academic and operational structures.

3.2 Summary of Methodologies and Research Framework

For the purpose of to conduct a thorough assessment of Kabul University's sustainability performance, this study utilize an Organizational Life Cycle Sustainability Assessment (OLCSA) framework. Three established methodologies Organizational Life Cycle Assessment (O-LCA), Life Cycle Costing (LCC), and Social Organizational Life Cycle Assessment (SO-LCA) are integrated into the OLCSA.

As indicated in Figure 3.2 the methodology consists of the following steps:

1- Carry out organizational life cycle assessment (O-LCA) to assess the environmental impacts of a university as an HEI using the methodology based on ISO/TS 14072.

2- Conduct life cycle costing (LCC) to assess the economic impacts using the methodology proposed by the recent Code of Practice on LCC (Swarr et al., 2011).

3- Perform social organizational life cycle analysis (SO-LCA) to evaluate the social impacts of using the methodology as described by the United Nations Environment Program/Society of Environment Toxicology and Chemistry (UNEP/SETAC) Guidelines for Social Life Cycle Assessment of Products (UNEP, 2020).

4- Determine OLCSA by combining O-LCA, LCC, and SO-LCA using the scoring system method, visualize the relationship between the three dimensions, and combine it.

The framework entails conducting an O-LCA according to ISO/TS 14072 in order to evaluate the environmental effects of the operations and activities of the university. In addition, an analysis of LCC was conducted according to the Code of Practice (Swarr et al., 2011) to assess the economic effects. In order to analyze the social effects, a social Organizational life cycle assessment (SO-LCA) was conducted following the UNEP/SETAC Guidelines for Social Life Cycle Assessment of Products (UNEP, 2020). The findings obtained from the O-LCA, LCC, and SO-LCA were merged utilizing a scoring system approach to ascertain a comprehensive O-LCSA, which will visually represent the interconnection between the three aspects. This comprehensive framework offers a thorough and all-encompassing view of the university's sustainability performance. It will facilitate informed decision-making and allow for the identification of areas for improvement.

A rationale or explanation regarding the choice of using O-LCA, LCC, and SO-LCA in this integrated framework is based on the life cycle sustainability assessment (LCSA) concept introduced by Klöpffer (2008). This technique enables a thorough assessment of sustainability performance by simultaneously considering the environmental, economic, and social aspects. Every method makes a distinct contribution to the comprehensive evaluation of university's sustainability.

The O-LCA offers a methodical methodology to measure environmental impacts throughout the university's complete value chain, providing insights that go beyond conventional environmental management systems (Martínez-Blanco et al., 2015). Furthermore, LCC enhances the environmental assessment by considering the complete economic consequences of university operations and activities, which sometimes include neglected long-term and indirect expenses (Rebitzer et al., 2008). Moreover, SO-LCA focuses on assessing the social aspect of sustainability by examining how the university affects different groups of people, including students, staff, and the wider community (Benoît et al., 2010).

Synergistic O-LCA, LCC, and SO-LCA can determine the sustainability trade-offs and co-benefits. For instance, LCC investments in energy-efficient infrastructure may reduce environmental consequences (O-LCA) and improve staff working conditions (SO-LCA). However, integrating these strategies is difficult, given that the three techniques' diverse emphasis areas and indicators, data collection, and analysis can be inconsistent (Guinée et al., 2011). Furthermore, a complex organization like a university may struggle to define system boundaries spanning environmental, economic, and social considerations (Sala et al., 2013). Methodological and ethical issues arise when weighting and aggregating data from the three assessments into a single sustainability score (Finkbeiner et al., 2010). Consequently, this integrated method provides a holistic view of university's sustainability, but it has limits. Complexity may make the assessment resource- and time-intensive, restricting its use. The lack of standardized metrics, especially for SO-LCA in higher education, may further impair findings comparability.

Integrating O-LCA, LCC, and SO-LCA provides a thorough perspective on sustainability. However, this approach poses challenges in terms of data compatibility and integration. In order to address this issue, a uniform system for collecting data has been created, which ensures consistency in the indicators used across all three methods. This paradigm guarantees uniformity in data collecting and processing, hence enabling more precise comparisons and seamless integration of findings. Specifically, the environmental impacts of O-LCA are linked to their corresponding financial expenses in LCC and societal impacts in SO-LCA. This method enables a more sophisticated comprehension of the interrelationships among the environmental, economic, and social aspects of sustainability (Guinée et al., 2011).

In addition, sensitivity studies were performed to assess the effect of important assumptions and data uncertainties on the final conclusions to ensure the strength and reliability of the integrated methodology. This technique not only improved the dependability of the results but also yielded valuable observations regarding the areas of sustainability assessment that need additional methodological improvement in the context of HEIs in developing countries. The Figure 3.2 well demonstrates the Research design framework of this study.

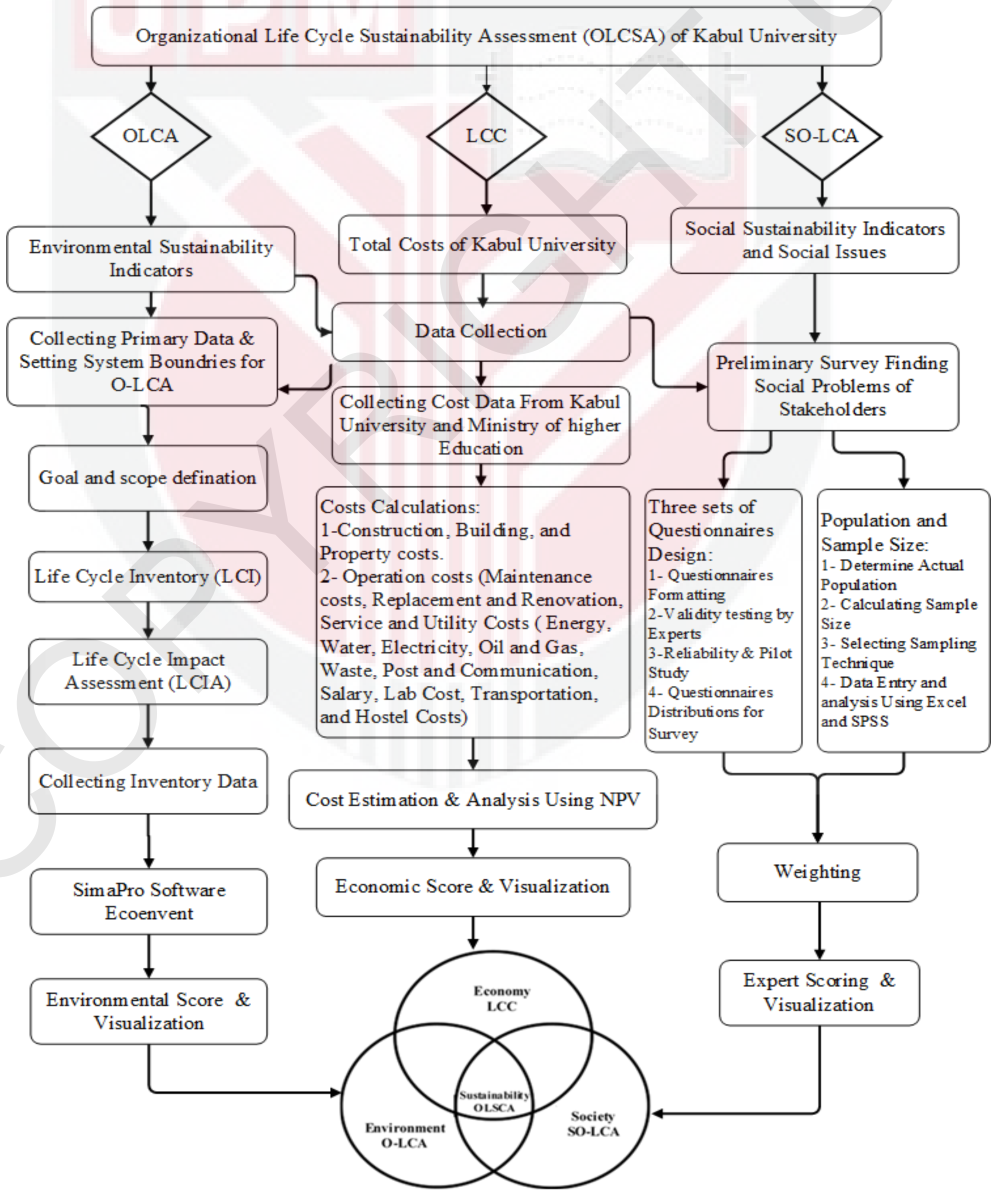

Figure 3.2 : Research design framework

3.3 Organizational Life Cycle Assessment

There is no specific evaluation available on the life cycle assessment (LCA) of HEIs. A literature analysis was conducted to examine the current methods used to ecologically assess HEIs. The literature research aimed to identify the methodological approaches employed, activities evaluated, and environmental impacts assessed by HEIs. Publications that conducted environmental assessments of an HEI, campus, or faculty were identified. Assessments that evaluated greenhouse gas (GHG) emissions and also, ideally, a broader range of environmental impacts, were considered (Jürgens et al., 2023).

The methodology for conducting LCA on HEIs is discussed based on the framework outlined in ISO/TS 14072 and insights from the literature review. The approach is outlined according to the ISO/TS 14072 structure and includes the following aspects:

1. Goal and scope.
2. Life cycle inventory (LCI).
3. Life cycle impact assessment (LCIA).

The motivation for O-LCA is to ensure meaningful performance tracking. Performance tracking, a promising application for O-LCA, is an ongoing evaluation of an organization's environmental performance through time to determine its rate of improvement (Martínez-Blanco & Finkbeiner, 2017). As previously stated, the O-LCA method is developed from ISO/TS 14072. Additional international reference guidance and reports that provide greater depth in the implementation of LCA and organizational value chain techniques can also help with phases that have not been thoroughly explained (UNEP/SETAC, 2015). The Figure 3.3 indicates the combined structure of O-LCA and LCA adopted form the Manzardo, Loss, Niero, Vianello, & Scipioni (2018) study.

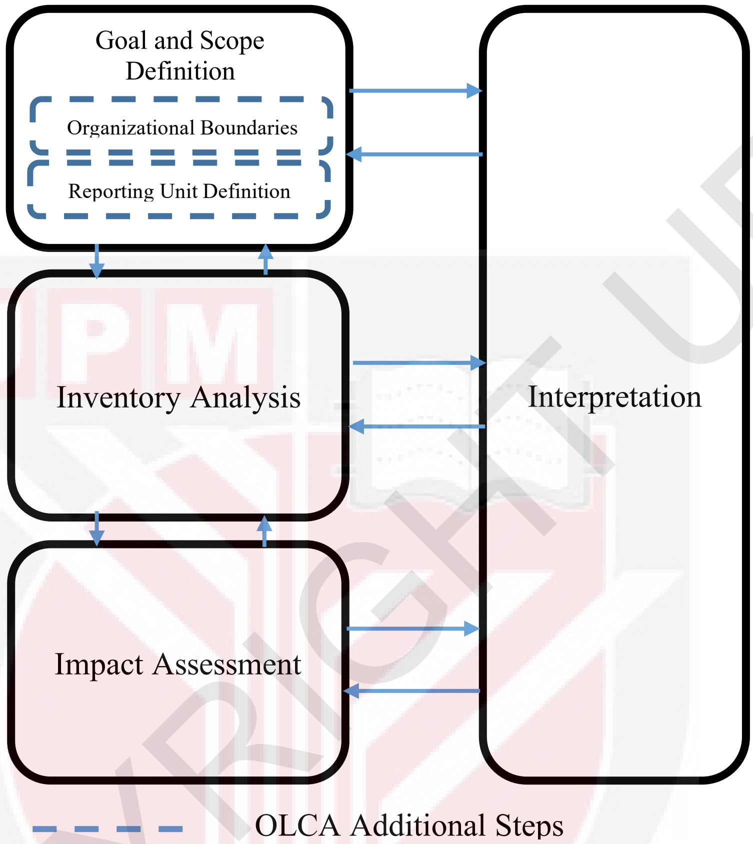

Figure 3.3 : A combined structure of O-LCA and LCA (Manzardo, Loss, Niero, Vianello, & Scipioni, 2018)

The methodology for conducting an O-LCA typically involves the following steps:

1. Goal and scope definition: The first step is to define the purpose and scope of the assessment, including the boundaries of the organization and the environmental impacts to be evaluated.

2. Inventory analysis: This involves collecting data on the inputs and outputs of the organization at each stage of its life cycle, including raw materials, energy consumption, and waste generation.

3. Impact assessment: The collected data are then used to assess the environmental impacts associated with each stage of the organization's life

cycle. This can include impacts such as GHG emissions, water use, and waste generation.

4. Interpretation: The results of the impact assessment are then interpreted to identify areas where improvements can be made to reduce the organization's environmental impact.
5. Reporting: Finally, the results of the O-LCA are reported to stakeholders, including customers, investors, and regulators, to inform decision-making and improve transparency.

Implementing O-LCA in universities, particularly in the specific circumstances of a developing country like Afghanistan, has distinct and specific difficulties. Universities are complex establishments that engage in a variety of activities, including teaching, research, and administrative tasks. It is crucial to precisely define system boundaries and functional units for each of these activities, as they have unique environmental implications (Lo-Iacono-Ferreira et al., 2017). Besides, O-LCA can be used by organizations of all sizes and types to identify opportunities for environmental improvement and to demonstrate a commitment to sustainability.

3.3.1 Definition of Goal and Scope

Organizational life cycle assessment is a tool used to evaluate the environmental impacts of an organization over its entire lifespan. The assessment considers different stages of an organization's life cycle, including the extraction of raw materials, production, distribution, use, and end-of-life disposal. Furthermore, an organization's LCA concentrates on its own reporting rather than comparing it to other organizations. This strategy should also be applied in HEIs.

The goal of an HEI's O-LCA should be to help the institution track and improve its performance. At the same time, it should be utilized to report on the HEI's environmental impact over a set time period (Jürgens et al., 2023). The goal of this OLCA study is to study the environmental impacts of Kabul University as an HEI in Afghanistan. Details related to the university are as follows:

- Name of Organization: Kabul University, Afghanistan
- Location: Kabul, Afghanistan
- Business sector: Higher education
- Description of faculties: 21 faculties in one campus
- Teaching and research areas: Social (economic, political, public policy, literature, and Islamic sharia and law) and natural science (engineering, science, environment, and veterinary science)

The scope of the O-LCA for Kabul University as a case study of the HEIs in Afghanistan is to evaluate the complex implications of the higher education system and to ensure that it is in line with the demands of society. Open innovation and continuous monitoring are incorporated to drive improvements while addressing the practical challenges of implementation and simultaneously assessing environmental, social, and economic impacts.

3.3.2 Reporting Organization

The reporting organization of this study is Kabul University, the largest and historical HEI in Afghanistan. The university's operations and activities form the basis for data collection and analysis in this organizational life cycle assessment.

Universities can be identified by their name and location, the type of activities they perform, the description of their campuses or faculties, their size (e.g., the number of students they have and the number of programs they offer), and their mission statement or study priorities. A university does not have an immediate impact on the lifestyle of students and staff; hence, it lacks operational control. Effective public transport links or proper cycling infrastructure can significantly impact commuting behavior. Therefore, these factors should be included in the LCA, even if they are not directly controlled by the HEI (Jürgens et al., 2023).

The reference period, which is often a calendar year, must be specified in the LCA. Institutions of higher learning can think about implementing an academic calendar with separate semesters for winter and summer. Statistics from several HEIs are available for a single academic year. Yearly reports detailing the amount of water and power used in buildings are frequently provided. According to the literature research, a calendar year is the most often used timeframe in the publications examined. Data gaps for the designated reference period can be recognized and accounted for as exceptions. Regardless of the timescale selected, annual assessments require consistency in identifying the reference period. As the reference period varies throughout the year, breaking it up into smaller timeframes like specific semesters is not recommended. The available courses can call for different amounts of equipment, and the heating needs might change as the outside temperature changes (Jürgens et al., 2023). Additionally, the year 2020 is the reference period for this O-LCA study.

3.3.3 Reporting Flow

The reporting flow measures the productivity of HEIs and universities. An HEI primarily offers two services that constitute its academic output: instruction and scholarly investigation. Kabul University has 20 faculties and administration-related facilities. The faculties provide the teaching and learning activities in their departments, where professors are involved in research activities for their academic promotion purposes and students are engaged in monograph (thesis) writing in the last semester of their program.

The reporting flow describes Kabul University's academic activity for the 2020 reference year, which involved 889 academic staff, 325 administrative staff, and 23,452 students. Table 3.1 provides more detailed statistics. In a manufacturing company, the reporting flow is often established by using the annual production figures of the product portfolio as a standardized measure for all goods. Therefore, it is preferable to use similar or equal measures for assessing teaching and learning, and research activities. However, this presents a more significant obstacle (Jürgens et al., 2023). Table 3.1 presents various indicators for the O-LCA of Kabul University.

Table 3.1 : Chosen indicators for the O-LCA of Kabul University

Indicator	Amount	Unit	Reference Period
Number of Students	24,633	Person	2nd Semester 2020
Number of Academic Staff	889	Person	2020
Number of Administrative Staff	325	Person	2020
Degree Programs	103	–	2021
Number of Graduates	3,677	Person	2020–2022
Funding	653,634,903	USD	2020
Area	23,320.3	m^2	2021
Number of Buildings	53	–	2022

3.3.4 System Boundary

In the context of a sophisticated institution such as a university, it is essential to establish system boundaries that incorporate all significant functions, such as teaching, research, and administration.

A gate-to-gate approach is suggested considering the difficulties associated with quantifying the downstream environmental impacts of Kabul University as an institution, specifically those related to teaching, learning, and research activities. According to Jürgens et al. (2023), Chatterton et al. (2015) first quantified the environmental impacts of research activities. Complete inputs and outputs associated with the activities of Kabul University should be taken into account, and any activity exclusion must be supported by justification. The facilities utilized during teaching, learning, and research activities should take into account those contributing to the environmental impacts of HEIs. According to the UNEP/SETAC 2015 guideline, activities that complete the working environment should be clearly included in the organization's LCA.

As previously suggested in the methodology, a gate-to-gate approach is suitable for conducting the LCA of Kabul University. The environmental consequences that occur because of the academic activity downstream are not considered in the LCA. The study did not include the Afghanistan Information Center at Kabul University or any other externally administered organizations that are located nearby. The system boundaries of Kabul University as an HEI in Afghanistan are presented in Figure 3.4.

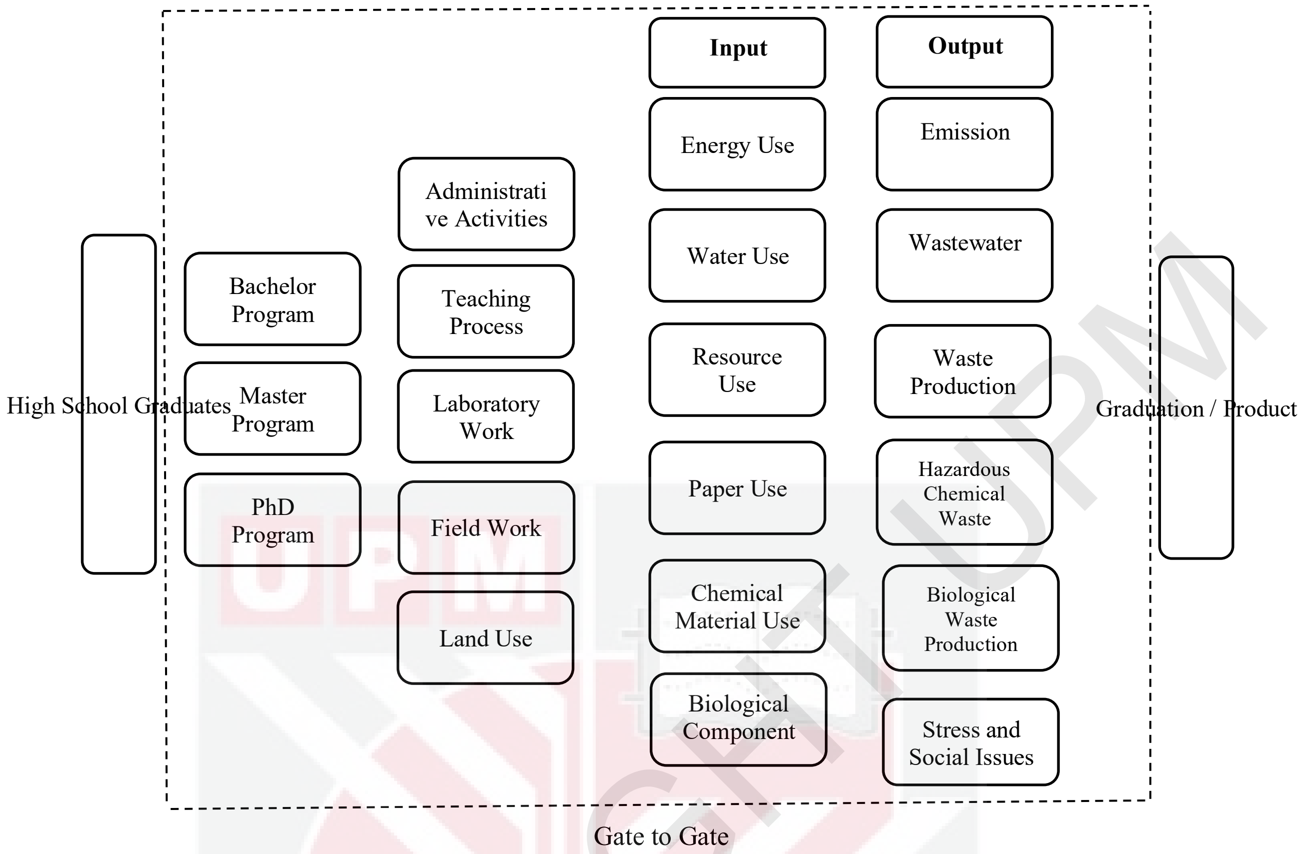

Figure 3.4 : System boundaries of the OLCA study of Kabul University O-LCA study

3.3.5 Life Cycle Inventory Analysis

3.3.5.1 Life Cycle Inventory

Each HEI must identify activities that must be considered in its LCI. The literature analysis and general information from ISO/TS 14072 revealed various activities that may be applicable to most HEIs. Moreover, Jürgens et al. (2023) suggested the list in Table 3.2 regarding different types of possible inventory flows that an HEI could have. The LCI of Kabul University was compiled using the primary data obtained from the HEI whenever feasible. Therefore, this table was adopted for the O-LCA of Kabul University, based on the facility and service that Kabul University uses.

Table 3.2 : Different categories of potential life cycle inventories for HEIs

Category	Inventory Flows
Energy supply	Electricity, heat consumption, fuels
Infrastructure	Office furnishings, IT equipment
Operating materials	Water consumption, office supplies
Transport	Commuting of employees and students
Waste	Waste

Detailed information about Kabul University's activities and resources is available from the university's respective departments. This encompasses the primary operations of Kabul University, such as the burning of fuel in the universities, and, if feasible, even significant secondary operations, such as the power usage of the university's affiliated departments. For other ancillary operations, it is also advisable to utilize precise data, although this may not always be feasible in practice. For such instances, it is necessary to utilize generic data. When evaluating Kabul University as an HEI, it is important to consider how data gaps are addressed, how different levels of data quality are handled, the methods used for allocating resources, and the criteria used to determine cut-off points.

Data quality and availability might pose substantial challenges in the setting of a developing country. Inadequate environmental monitoring and record-keeping techniques can lead to gaps in data. In order to tackle these difficulties, it is essential to use strategies for managing data uncertainty, such as utilizing proxy data, employing data quality evaluation frameworks, and conducting sensitivity studies (Heijungs & Huijbregts, 2004). Collaborating with local stakeholders, such as university departments and external partners, can further enhance data collection endeavors.

To address this limitations typical of developing countries such as Afghanistan, the following strategies were implemented: Initially, in cases where direct energy consumption data were not accessible, estimations were made using the data obtained from universities in Germany by Jürgens et al. (2023). These estimations were adjusted to account for variations in scale and infrastructure (Mussawy & Rossman, 2021). Furthermore, sensitivity analyses were performed to evaluate the influence of data uncertainty on the findings of this study. The process entailed generating various scenarios with different data inputs in order to assess the impact of probable mistakes in the findings (Ciroth et al., 2016).

3.3.5.2 Life Cycle Impact Assessment

In order to assess the environmental impacts of HEIs and universities, it is crucial to use a suitable LCIA technique. The LCIA approach should have extensive geographical exposure. Simultaneously, it is important to encompass as many impact categories as possible, particularly considering the notable disparity between the number of carbon footprint studies and LCA investigations. There are several LCIA methods available for conducting LCA research. The International Standard for Life Cycle Assessment (ISO 14040–14044) does not prescribe a specific method for LCIA, resulting in the selection of LCIA methods varying from one study to another (Dekker et al., 2020).

The ReCiPe 2016 approach seems to be the most suitable LCIA method for conducting an LCA of HEIs and universities. The dataset incorporates normalization variables for Europe and provides a comprehensive global perspective, encompassing all prevalent effect categories. Simultaneously, it is the methodology endorsed by the European

Commission in the Organization Environmental Footprint (OEF) (Pelletier et al., 2014), which was founded based on ISO/TS 14072. The coverage extends to the impact categories of acidification, ionizing radiation, human toxicity (both carcinogenic and non-carcinogenic), ozone depletion, eutrophication of the Earth's atmosphere, freshwater and terrestrial ecosystems, Eco-toxicity of freshwater, land and water utilization, resource depletion for fossil fuels, and resource utilization for metals and minerals, all of which are factors contributing to climate change and ozone depletion (Jürgens et al., 2023; Pelletier et al., 2012).

3.3.5.3 Life Cycle Interpretation

Life cycle interpretation is the concluding stage of LCA when conclusions and suggestions are derived from the results of the LCI and LCIA. When conducting an O-LCA of infrastructure, it is crucial to thoroughly analyze and effectively convey many significant sources of uncertainty (Laurent et al., 2021; Saxe et al., 2020).

The LCI of Kabul University as an organization of HEI was prepared based on the primary data possibly included in the system boundary. The availability of the data is a big challenge during data collection and accuracy. The data were collected from the offices of the Chancellor, Vice Chancellor of Academic, Vice Chancellor of Administration and Finance Affairs, and Vice Chancellor of Student Affairs. Moreover, the financial data were also collected from the Ministry of Higher Education Afghanistan, which were shared with the Ministry of Finance Afghanistan for further process and control.

3.3.5.4 Data Quality

The data were collected from related departments of Kabul University and double-checked with other related departments. For example, the quantity of fuel was mentioned in the Logistics Department of Kabul University and was also found in the Finance Department. Some of the data that were reported in related departments and were not found in other departments were also rechecked with the department's archive.

In order to effectively communicate the dependability of the outcomes, it is essential to incorporate a framework for evaluating the quality of the data. This framework has the capability to assess data using several criteria, such as completeness, consistency, and accuracy. Through the evaluation of the quality of the data in the O-LCA, stakeholders can have a clearer understanding of the strength and reliability of the findings, as well as the target areas that can be improved (Guinée et al., 2011).

3.4 Life Cycle Costing

Life cycle costing is applied to conduct an analysis of the economic indicators for the purpose of sustainability assessment (Arulnathan et al., 2023; Hoogmartens et al., 2014) In a manner parallel to the selection of environmental indicators, decision-makers have the ability to select relevant economic indicators in order to evaluate the economic component, which includes capital expenses, feedstock costs, production costs, and operation and maintenance costs (Arulnathan et al., 2023; Falcone et al., 2015; Ren et al., 2015).

In the present research, LCC was selected with the intention of calculating an estimate of the costs of Kabul University as an HEI and its provided service associated with the product (i.e., the student) by locating and analyzing all the primary costs associated until graduation. Nevertheless, no universally recognized approach exists for LCC. Swarr et al. (2011) issued a code of practice to generate consensus for an international standard that parallels the ISO 14040/14044 LCA standards. Considering the use of the LCC in this study, only internal real cash flows from the producer's perspective are examined in this analysis.

To ensure the consistency and comparability between the O-LCA and LCC result, this study employed unified approach for defining the reporting unit and system boundary. For both assessment, the reporting unit was defined the educational activities for one student covering duration of a degree program from entry to graduation. A gate-to-gate (student entry to university until graduation) were selected as the reporting unit. The LCC system boundary was comparable to the O-LCA, encompassing all direct and indirect costs associated with the student education activities.

Following the defined system boundary and reporting unit in line with comment practices found in the literature for LCC can be calculated using its designated method. Some elements and components must be calculated based on the nature of the study. According to Han, Srebric and Enache-Pommer, (2014), calculating the LCC of a house or building includes three main phases based on the net present value (NPV) in Equation 3.1: construction, yearly operation, and maintenance costs.

$$NPV(i, N) = \sum_{t=1}^{N} \frac{Ct}{(1+r)^t} \quad \text{(Eq.3.1)}$$

Where *NPV* is the present value, *t* is the time of the flow of cash, *N* is the system's lifespan, *Ct* is the net cash flow at a specific time *(t)*, and *r* is the discount rate.

The technique of calculating NPV is known as discounting future cash flows. During the evaluation of the project, the NPV is the instrument that is most frequently associated with the gain to the company. It is likely that prospective investors will consider it a beneficial option when evaluating the factors involved in their decision-making process. When the NPV is negative, it indicates that the costs of the project are more than the benefits that it will produce. As a result, it is clear that the project cannot be sustained financially. A project's payback period is the amount of time that must pass before all of the initial investment can be recouped from the cash flow that is anticipated to be generated by the project. It is also known by the name "payback," which is a more straightforward concept both to comprehend and to compute than any other method. The payback period may be easily calculated by simply adding up all of the future cash flows and understanding how long it will be before the initial investment is fully recovered (Gharib & Benabbou, 2016). As the aggregated cost data offer a direct impact measure, the LCC technique does not require the impact assessment phase to be completed (Swarr et al., 2011). Therefore, all the costs collected from the inventory process were categorized into one of the following categories: maintenance, replacement, and renovation; energy; water; electricity; oil and gas; waste; post and communication; salary; laboratory costs; transportation; and hostel costs.

In accordance with the guidelines provided by the UNEP/SETAC, the impact assessment is not required when using the LCC technique because it is thought that the cost of segregation is sufficient to evaluate the economic implications (Dong & Ng, 2016).

There is no consensus on which discount rate should be utilized for an LCC. Thus, a sensitivity analysis with various discount rates is recommended (UNEP, 2011). In this study, the discount rates of 20%, 40%, and 50% were applied to determine the NPV.

In addition, previous studies suggested different discount rates based on the sensitivity analysis (Almansa & Martínez-Paz, 2011; Matousek et al., 2022). Consistency in the analysis requires accounting for inflation using either real or nominal terms. Given the fluctuating inflation rates in Afghanistan, it may be more suitable to use real terms, which include converting all future costs to their present-day values. The selection of the discount rate is crucial and should accurately account for the concept of the time value of money and the level of risk connected to future cash flows. To account for the economic uncertainties in Afghanistan, a sensitivity analysis was conducted using various discount rates, such as 20%, 40%, and 50% (Almansa & Martínez-Paz, 2011; Matousek et al., 2022).

In the LCC interpretation step, sensitivity analysis is also used to obtain the results or recommendations related to the goal (Gluch & Baumann, 2004; Scope et al., 2016). A minor change in the overall result indicates that there is only a slight change in the individual parameter, which is not significant. However, a big change in the total score means that a small change in one measure could have a big impact on the whole evaluation (Heijungs et al., 2013).

However, this study aimed to adopt the methods that used the existing calculations in the literature. According to the literature search, several studies calculated the LCC of university residential or non-residential buildings using different elements. Finally, based on this review, finding a specific method required for the LCC of higher education would involve modifications and developments of the method in combination with the building's life cycle elements and components, such as facilities, services, operations, constructions, laboratory facilities, safety, and student costs.

Practicing LCC in higher education is limited, and no study has used the LCC method for education services. Instead, several studies estimated the LCC for university buildings (Bromilow & Pawsey, 1987; Huang et al., 2018; Kimoto et al., 2013; Li & Guo, 2012; Xue et al., 2020), university accommodations and dormitories (Huang et al., 2018; Teshnizi et al., 2018), and schools (Bull et al., 2014; Erling Salicath, 2016). The lack of studies has encouraged this current study to be conducted by adopting a method for LCC in higher education. For university buildings, the LCC is significantly used to recognize and choose the best option for costs based on several strategies, such as energy efficiency and others (Tabrizi & Sanguinetti, 2015). The value of university facilities is challenging to calculate due to their maintenance and operations rather than commercial assets (Bromilow & Pawsey, 1987). Additionally, Kim, Kim, and Lee (2014) calculated the initial construction, operation and maintenance, and demolition costs.

Consequently, there is no method to calculate the LCC of higher education, which comprehensively includes the total cost of higher education, building, services, and operations. Therefore, it is imperative to develop some indicators for education services and facilities, especially the university's assets, such as university buildings, libraries, laboratories, auditoriums, classrooms, dormitories, cafeterias, and offices. Furthermore, it is necessary to calculate the cost of the services provided by universities. Table 3.3 was adopted for the calculation of all costs related to HEI's services.

Table 3.3 : Calculation of LCC indicators for the year 2020/1399 Hijri year

Domains	Components	Contents
Construction, Building, and Property Costs	Property costs	Land
	Building costs	Buildings
Operation Costs	Maintenance costs	Maintenance, replacement, and renovation
	Service and utility costs	Energy
		Water
		Electricity
		Oil and gas
		Waste
		Post and communication
		Salary
		Laboratory costs
		Transportation
		Hostel costs

Based on Table 3.3, the costs for providing services were calculated based on the cost inventory data for the year 2020. All the costs were categorized into two domains: the construction, building, and property costs, and the operation costs. The property costs and building costs were calculated under the domain of construction, building, and property costs domain, whereas the maintenance costs and service and utility costs were calculated under the domain of operation costs. The components of maintenance costs were divided into maintenance, replacement, and renovation, while the components of service and utility costs were divided into energy, water, electricity, oil and gas, waste, post and communication, salary, laboratory cost, transportation, and hostel costs.

Using a spreadsheet, all costs associated with maintenance, replacement, and renovation; energy; water; electricity; oil and gas; waste; post and communication; salary; laboratory costs; transportation; and hostel costs were compiled for the university service provision. The costs were calculated for the reporting unit and by considering students' graduation period of four, five, or six years, based on the regulations and bylaws of the Ministry of Higher Education. The gathered economic data were entered into a Microsoft Excel spreadsheet model designed to calculate different cost categories. This study included a financial evaluation analysis. Additionally, this analysis only considered two financial indicators (NPV and payback period (PBP).

Estimating expenses in a volatile economic setting such as Afghanistan poses distinctive difficulties. The presence of political uncertainty has a negative impact on the availability of funding sources, while the volatility of currency exchange rates affects international transactions. Moreover, there are fluctuating inflation rates and possible interruptions to the flow of goods and services along supply chains. In order to tackle these difficulties, it is advisable to integrate scenario analysis and sensitivity testing into LCC. This entails creating several cost forecasts using different economic scenarios and examining how the findings are affected by changes in important variables (Kishk et al., 2003).

3.4.1 Scenario Analysis for Economic Uncertainties

In consideration of the economic instability in Afghanistan, scenario assessments were performed by taking into account various inflation rates and funding scenarios in order to present a spectrum of potential LCC outcomes. This approach enables a more comprehensive evaluation of enduring expenses in an unpredictable setting. Three different scenarios were established, including the base case scenario, which uses improved economic indicators and funding levels; the optimistic scenario, which assumes improved economic stability and increased funding; and the pessimistic scenario, which considers potential economic deterioration and reduced funding. Furthermore, the parameters for each scenario were adjusted, where the inflation rates were varied from the current rate of potential increase or decrease, the funding levels considered potential changes in government and international support, the exchange rates accounted for possible fluctuations affecting international transactions, and the operational costs were adjusted for potential changes in resource availability and prices.

These scenarios were applied in the LCC model, with a specific emphasis on long-term forecasts for maintenance, renovation, and operational costs. This technique provides a variety of prospective outcomes, providing a more thorough perspective on the alternative financial possibilities for Kabul University. The results of this scenario analysis are displayed in Table 3.4, where the NPV and PBP for each scenario are presented.

Table 3.4 : Net present value and payback period for each scenario

Scenario	Base Case	Optimistic	Pessimistic
Description	Current economic indicators and funding levels	Improved economic stability and increased funding	Economic deterioration and reduced funding
Inflation Rate	[Current rate]	[Lower rate]	[Higher rate]
Funding Level	[Current level]	[Increased by X%]	[Decreased by Y%]
Exchange Rate (AFs to USD)	[Current rate]	[Stronger AFs]	[Weaker AFs]
Discount Rate	20%	40%	50%
NPV	[Calculate]	[Calculate]	[Calculate]
PBP	[Calculate]	[Calculate]	[Calculate]

This scenario analysis aims to address the difficulties of projecting long-term costs in Afghanistan's volatile climate. It offers decision-makers a more detailed understanding of the possible financial outcomes, as supported by the research of Kishk et al. (2003) and Mok & Shen (2016).

3.5 Social Organizational Life Cycle Assessment

The term SO-LCA refers to the specialized process of analyzing the actions and results of organizations (Martínez-Blanco, Lehmann, Chang, et al., 2015). The SO-LCA approach is appropriate for the setting of LCA research. This study adheres to the methodological approach by Martínez-Blanco et al. (2015). In fact, SO-LCA is capable of overcoming the majority of challenges, such as the complexity of social factors and the singularity of the method (Karlewski et al., 2019; Martínez-Blanco et al., 2020). This technique may also be considered for social elements, which are difficult to quantify using performance measures but are essential to do so throughout the life cycle (Karlewski et al., 2019). Besides, SO-LCA could promote data collection because it is more likely that relevant data will be collected at the organization level than at the product level.

Given the widespread use of S-LCA and O-LCA paradigms in SO-LCA investigations, these studies have been categorized into four main components: defining the objective and scope, conducting an inventory, assessing the impact, and interpreting the findings according to the recommendations set by ISO 14040 and ISO 14044 (García-Muiña et al., 2022). The SO-LCA in this study followed UNEP/SETAC (2020) procedures and guidelines.

A clear definition of the goal is required when initiating a SO-LCA study. The UNEP/SETAC (2009) and UNEP (2020) guidelines state that “the ultimate objective for conducting S-LCA and SO-LCA techniques is to promote the improvement of social conditions and the overall socio-economic performance of a product throughout its life cycle for all of its stakeholders.” The goal of this study was to carry out SO-LCA to determine the positive and negative social impacts of the services of Kabul University. The system considered for this study was the higher education services in an organization.

3.5.1 Adaptation of Social Indicators to the Afghan Context

In order to successfully implement SO-LCA in the specific context of higher education in Afghanistan, adjustments were made to the UNEP/SETAC social indicators to more accurately capture the distinct social complexities present in Afghanistan. This involved modifying indicators to accommodate local cultural norms and socio-economic realities.

The fair salary indicator was modified to correctly represent the local wage standards and cost of living, thereby ensuring that the assessment effectively covers the economic conditions experienced by university staff (Martínez-Blanco et al., 2015). The health and safety indicator was broadened to encompass the assessment of security risks specific to the Afghan environment, such as potential risks posed by extremist organizations.

Measuring various social impacts in the Afghan context is difficult due to a lack of data and the complexity of social dynamics. In order to address these challenges, a blend of qualitative and quantitative methodologies was utilized. Interviews were conducted with important stakeholders, including university administrators and faculty members, in order to obtain insights on social conditions that are difficult to measure. Furthermore, proxy indicators were employed and expert consultations were sought to address missing data.

The selection of particular social indicators was determined based on their relevance to the Afghan higher education context and their congruence with the Sustainable Development Goals (SDGs). The health and safety and equal opportunity indicators were given priority due to their crucial significance in post-conflict settings, where the restoration of faith in institutions and the guarantee of fair treatment are of utmost importance.

3.5.2 Stakeholder Identification

The social life cycle assessment (S-LCA) framework calls for a stakeholder strategy, in which the possible effects on different groups of stakeholders are taken into account. This shows that social sustainability is about figuring out how people (stakeholders) are affected, both positively and negatively, and controlling those effects. Social impacts are put into groups based on who is affected by them. This helps with implementation and makes sure that the framework is complete (UNEP, 2020). The UNEP/SETAC (2009) social life cycle assessment (S-LCA) and UNEP (2020) guidelines for product and organization define the stakeholders, subcategories, and indicators of social impact assessment.

A SO-LCA evaluation is based on the stakeholder categories because they need to be used to explain why something should be in the scope or not. Impact subcategories have themes or qualities that are important to society and are linked to the stakeholder groups. Impact indicators are used to evaluate these categories. Inventory indicators, which are part of the impact indicators, link directly to the inventory of the product life cycle. There are several ways to measure each category. These signs may vary depending on the focus of the study. The objective of classifying impact subcategories into broader impact categories, along with stakeholder categories, is to enhance understanding and facilitate further impact assessment and interpretation (UNEP, 2020).

Based on the UNEP (2020) guidelines on SO-LCA, 6 main stakeholder categories are divided into 40 subcategories for the S-LCA of product and organization: workers with 11 subcategories, local community with 9 subcategories, value chain actors with 5 subcategories, consumer actors with 5 subcategories, society actors with 7 subcategories, and children with 3 subcategories (UNEP, 2020). The workers (academics and administrators) and consumers (students) were considered stakeholders in this study to evaluate the SO-LCA of HEIs. However, the local community, value chain actors, society, and children stakeholders were excluded in this study. Higher education services were found to be important for 12 subcategories for the chosen workers (academic and administrative staff) and consumers (students). Table 3.5 shows the most significant categories and subcategories that need to be evaluated.

Table 3.5 : Categories and subcategories of stakeholders based on UNEP (2020) guidelines

Stakeholder Categories	Subcategory Indicators
Workers (Academic and Administrative Staff)	Job satisfaction Fair salary Discrimination/Equal opportunity Health and safety Social benefits Employment relationship Sexual harassment
Consumers (Students)	Health and safety Feedback mechanism Privacy Transparency End-of-life responsibility

3.5.3 Goals and Scope

Defining the study's aims, objectives, and methodology is the first step in conducting social life cycle assessment (S-LCA) and SO-LCA analysis. The objective is to make a bold assertion regarding the extensive and comprehensive nature of research. This is an important stage that will have far-reaching consequences for the rest of the procedure; emphasizing it will help the researcher make the most informed decisions (UNEP, 2020). The data are intended for internal decision-making, performance monitoring, and communication, not public comparisons. The ultimate goal is to assess the social conditions of an organization (HEI or university) and its value chain for its workers (academics and administrative staff) and consumers (students) at Kabul University.

3.5.4 Reporting Organization

The organization, Kabul University, is one of the most important HEIs in the structure of the Ministry of Higher Education of Afghanistan. Kabul University offers programs in economics, literature and languages, agriculture, veterinary science, engineering, computer science, political science, natural science, social science, fine art, geoscience, environment, and Sharia disciplines. Kabul University supports the young generation of Afghanistan and produces human capital for Afghanistan and the international job market. Kabul University has strategic collaborations with local and international agencies, government, and the commercial sector in Afghanistan. Furthermore, Kabul University conducts strategic cooperation with relevant ministries, agencies, industries, and non-governmental organizations for community development programs and collaborative activities.

3.5.5 Reporting Flow

According to the methodology in UNEP (2020) guidelines, SO-LCA subcategories can categorized based on six stakeholder categories: workers, consumers, local community, society, value chain actors, and child. This study assess the categories for workers (academic and administrative staff) and consumers (students) as the stakeholders and assessed the subcategories under them (job satisfaction, fair salary, discrimination/equal opportunity, health and safety, social benefits, employment relationship, sexual harassment, health and safety, feedback mechanism, consumer privacy, transparency, and end-of-life responsibility, respectively.

It would not make sense for universities to be the sole organization that attempts to try to improve how well health and safety risk management works (Petersen et al., 2008).

Protecting the health and safety of students means shielding them without cost from any risks to their well-being (ISO 26000, 2008). Consumers and their activities merit greater consideration (Brinkmann, 2004). Through feedback tools, consumers (students) can get in touch with organizations. In the feedback part, the effectiveness of management strategies is meant to make it easier for customers to give feedback (Sining et al., 2022). This subcategory may also be used to evaluate other ways of managing customers' feedback, such as the number and quality of organizational replies. Consumer happiness can be measured in a roundabout way by looking at the tools the company gives them (Sining et al., 2022). Martínez-Blanco et al. (2015) recommended that it is put in terms other than physical ones. However, it is important to note that some social effects are also tied to the product itself. This means that a change in the type of product could affect these social markers. In this study, the product is education, which may have an effect on how these social indicators (health and safety, feedback mechanism, customer privacy, transparency, and end-of-life responsibility) are perceived by consumers (students) (Sining et al., 2022).

3.5.6 Questionnaire Design

In this study, the questionnaires wads meticulously designed to align with the research objective ensuring the clarity, relevance, and ease of response. The design process involved identifying key social impact indicators, structuring questions to capture meaningful data, and refining the questionnaires through expert reviews before distribution to respondents.

Three sets of questionnaires were designed for each stakeholder involved in this study. The inventory data were collected from the workers (academic and administrative staff) and consumers (students) at Kabul University through validated questionnaires, which were developed based on the informal interviews with each of the named categories to identify the key issue at Kabul University and put the contents based on the realities on the ground. The questionnaires were distributed to students and also academic and administrative staff. The questionnaires were translated to Dari and involved scaled questions. To make it easy and motivate the respondents, the questionnaires were distributed based on the choice of respondents' language (i.e., English and Dari). Researchers frequently employ Likert-type scales, where five-point Likert scales are used to determine the respondents' level of agreement or disagreement with a given statement. The questionnaires for the workers were designed based on Likert scale questions with five choices after discussion with experts. These questionnaires were divided into eight sections, including the demographic profile of respondents, and seven sections containing different subcategories.

The questionnaires for academic staff contained 113 questions designed to assess the inventory data of each subcategory, including job satisfaction (13 questions), fair salary (20 questions), discrimination/equal opportunity (14 questions), health and safety (22 questions), social benefits/social security (15 questions), employment relationship (16 questions), and sexual harassment (13 questions).

Table 3.6 : Description of the questionnaires for academic and administrative staff based on UNEP 2020 Guidelines for Social Life Cycle Assessment of Products and Organizations

Section	Variable	Number of Questions	Description
I	Demographic detail	11	To obtain the demographic details of the respondents.
II	Job satisfaction	13	To investigate the level of job satisfaction among the workers. Various factors influence the level of workers' job satisfaction (e.g., responsibilities, work content, and career opportunities).
III	Fair salary	20	To examine whether companies pay their workers a fair wage.
IV	Discrimination/Equal opportunity	14	To investigate if any discrimination is present based on sex, age, or nationality and also to identify whether the companies are able to handle all their workers equally.
V	Health and safety	22	To identify the compliance of companies with the measures on occupational health and safety and on prevention of any disease, injury, and/or accident in the workplace.
VI	Social benefits/social security	15	To examine if the companies provide their workers with social benefits and social security.
VII	Employment relationship	16	To investigate the level of relationship among the leadership and workers. Various factors influence the relationship of employment in organizations.
VIII	Sexual harassment	13	To identify sexual harassment issues in organizations.

Table 3.6 indicates the questionnaires for administrative staff contained 99 questions designed to assess the inventory data of each subcategory, including job satisfaction (17 questions), fair salary (17 questions), discrimination/equal opportunity (13 questions), health and safety (20 questions), social benefits/social security (13 questions), employment relationship (13 questions), and sexual harassment (6 questions).

The questionnaires for students were developed based on the Likert scale, and only questions related to the health and safety subcategory were developed based on the "yes" or "no" questions. The purpose of the various categories of questions is to obtain a subjective evaluation of the students' feelings or level of satisfaction. Based on the knowledge level of the students, it would have been difficult for them to respond with only five options for the health and safety subcategory; therefore, the "yes" or "no" type of response was utilized, and the remaining questionnaires were developed using the Likert scale. The Table 3.7 expresses that the questionnaires contained 81 questions designed to assess inventory data for each subcategory of the study, including health and safety (19 questions), feedback mechanism (18 questions), privacy (16 questions), transparency (14 questions), and end-of-life responsibility (14 questions), and the questionnaires were divided into six sections.

Table 3.7 : Description of the questionnaires for students based on UNEP 2020 Guidelines for Social Life Cycle Assessment of Products and Organizations

Section	Variable	Number of Questions	Description
I	Demographic detail	9	To obtain the demographic details of the respondents.
II	Health and safety	19	To identify the compliance of the organization with the measures on occupational health and safety and on prevention of any disease, injury, and/or accident in the workplace.
III	Feedback mechanism	18	To examine students' satisfaction level with the services provided by the university. Universities can only give quality education and measure student success with a robust feedback mechanism.
IV	Consumer privacy	16	To investigate the privacy issues raised in a university or organization. It is normal for a university to protect its students. If students are indeed considered consumers, they should have a voice in all policy decisions that affect them.
V	Transparency	14	To analyze the transparency in the university among students. Transparency requires us to ensure that students understand how assessment works and resources are used equally and transparently.

Table 3.7 : Continued

VI	End-of-life responsibility	14	To examine the end of life in a higher education organization upon graduation from the program. The accomplishment of graduating from university is a cause for celebration, but it also comes with obligations that must be met before students may go on to the next phase of their professional lives.

3.5.7 Validity and Reliability

It is vital to emphasize the importance of determining the content validity of a research instrument, such as a questionnaire, especially for the purposes of conducting research (Almanasreh et al., 2019). The surveys' validity and reliability have been singled out as the most important quality indicators (Kalvani et al., 2022).

3.5.7.1 Validity of Questionnaire

Therefore, to ensure that the questionnaires are suitable for the collection of relevant data that could assist the researcher in achieving the objectives of this study, a content validity test was conducted to ensure that the questionnaires elicited relevant data that could aid the researcher in achieving the objectives of this study. The validity also includes the accuracy and significance of the deductions derived from the collected data. To validate the survey questionnaire, content validity testing was performed to ensure that the number of items in each category was sufficient to adequately represent each category. The content validity index of Martuza (Indarta et al., 2023) was used to determine the validity of the questionnaire's items.

Content validity was carried out with eight experts in different disciplines. The scale-level content validity index (S-CVI) is defined as “the proportion of total items thought to be valid" or "the proportion of items on the instrument that content experts have rated 3 or 4." Developers of instruments already report on how the S-CVI is measured (Zamanzadeh et al., 2015). Meanwhile, the item-level content validity index (I-CVI) is determined by how many panelists give a score of 3 or 4, divided by the number of panelists present. Furthermore, the I-CVI is the percentage of people who think that each item is important. If the I-CVI is 1, it means that every panelist agrees with the item. For a Pilot test, the I-CVI should be at least 0.78 (Mohajan, 2017).

In order to appraise and validate the content validity of the study instrument, Yaghmaie (2003) suggested including 5–10 specialists. Therefore, the selected experts include a professor and former Chancellor of Kabul and Balkh Universities; a professor and an associate professor from the Faculty of Agriculture, Kabul University; a professor from the Faculty of Engineering, Kabul University; an associate professor from the Faculty of Literature, Kabul Education University; an associate professor from the Faculty of Geology, Kabul Polytechnic University; an associate professor from the Faculty of Sharia, Kabul University; and an assistant professor from the Faculty of Agriculture, Nangarhar University.

Table 3.8 : Details of the experts involved in item content validity of the questionnaires

Expert	Name	Position and Relevant Institution
1	Prof. Dr. Habibullah Habib	Professor at the Faculty of Environment and former Chancellor of Kabul and Mazar-e-Sharif Universities
2	Prof. Dr. Wakeel Ahmad Sarhadi	Professor in the Faculty of Agriculture, Kabul University
3	Assoc. Prof. Dr. Wali Mohammad Salari	Lecturer in the Faculty of Agriculture, Kabul University
4	Prof. Dr. Abdulqayoum Kareem	Professor in the Faculty of Engineering, Kabul University
5	Assoc, Prof. Dr. Baiturahman Roadwal	Lecturer in the Faculty of Literature, Kabul Education University

Table 3.8 : Continued

6	Assoc. Prof. Dr. Hamidullah Waizy	Lecturer in the Faculty of Geology, Kabul Polytechnic University
7	Assoc. Prof. Dr. Khwaja Mohammad Esami	Lecturer in the Faculty of Sharia, Kabul University
8	Assistant Prof. Dr. Gulab Khan	Lecturer in the Faculty of Agriculture, Nangarhar University

The above in Table 3.8 experts were selected based on their familiarity with Afghanistan's education system, who can realize the issues and challenges in this sector. The measure's objectives and a catalog of items were provided to the experts, who were then asked to assess the importance of each item. The validation checkbox was placed next to each item on the questionnaires, and the experts were given the option to select the Likert four-point scale to rate each item. The values were as follows: value 1 = not relevant, value 2 = somewhat relevant, value 3 = relevant, and value 4 = very relevant. Then, the proportion of the values was measured. This indicates the development of the questionnaire according to the subcategory and I-CVI. Additionally, some studies suggested that the I-CVI must be at least 0.78 (Polit & Beck, 2006; Venkitakrishnan et al., 2022).

On the other hand, it is possible to validate content face-to-face or virtually. If a non-face-to-face technique is used, the experts are typically given access to an online content validation form that has detailed instructions to assist with the material using the verification procedure. Cost, time, and response rate are the most crucial considerations (Sánchez-Guardiola Paredes et al., 2021; Yusoff, 2019). The non-face-to-face approach's response rate and time may present a difficulty because it may be difficult to get a response from the expert on time and there is a potential that there is no response at all, but its main advantage is cost savings (Yusoff, 2019). The Table3.9 indicates the number of expert and its implication for acceptability.

Table 3.9 : The number of experts and its implication on the acceptable cut-off score of CVI

Number of Experts	Acceptable CVI Values	Source of Recommendation
Two experts	At least 0.80	Davis (1992)
Three to five experts	Should be 1	Polit & Beck (2006), Polit et al., (2007)
At least six experts	At least 0.83	Polit & Beck (2006), Polit et al., (2007)
Six to eight experts	At least 0.83	Lynn (1986)
At least nine experts	At least 0.78	Lynn (1986)

Table 3.10 presents the I-CVI for all items in the questionnaires for academic staff, which ranged from 0.86 to 0.95.

Table 3.10 : The results of the I-CVI for items in the questionnaires for academic staff

Variable	Number of Questions	I-CVI
Job Satisfaction	17	0.95
Fair Salary	20	0.86
Equal Opportunity/Discrimination	17	0.89
Health and Safety	22	0.91
Social Benefits/Social Security	15	0.92
Employment Relationship	16	0.93
Sexual Harassment	13	0.90

Table 3.11 presents the I-CVI for all items in the questionnaires for administrative staff, which ranged from 0.85 to 0.91.

Table 3.11 : The results of the I-CVI for items in the questionnaires for administrative staff

Variable	Number of Questions	I-CVI
Job Satisfaction	17	0.87
Fair Salary	17	0.89
Equal Opportunity/Discrimination	20	0.86
Health and Safety	20	0.86
Social Benefits/Social Security	13	0.91
Employment Relationship	18	0.87
Sexual Harassment	11	0.85

Table 3.12 presents the I-CVI for all items in the questionnaires for students, which ranged from 0.78 to 0.89. Based on the results of questionnaire validation for the workers and stakeholders in Table 3.11–Table 3.13, the questionnaires are considered to be valid.

Table 3.12 : The results of the I-CVI for items in the questionnaires for students

Variable	Number of Questions	I-CVI
Health and Safety	24	0.89
Feedback Mechanism	18	0.88
Consumer Privacy	16	0.81
Transparency	14	0.78
End-of-Life responsibility	15	0.88

3.5.7.2 Reliability of Questionnaire

Assessing questionnaire reliability is important to ensure consistent and stable results for making valid conclusions. For a study that uses questionnaires to collect data, a pilot study is required to determine whether the item statements are presented effectively and whether the participants understand the expectations (Taber, 2018). A pilot survey is designed to evaluate the method and format of the questionnaire survey (Mariel et al., 2021). A pilot study is done to ensure that the items are understood by the respondents and to determine the accuracy and reliability of the instruments

(Daniels, 2022). In other words, a reliability test must be conducted to make sure that the items in the study consistently measure the same things (Marshall, 2005). It measures how often the same people get the same results from the same device at different times (Field, 2005).

The feasibility of a study and the steps that will need to be taken to make it a success can be determined with the help of a pilot study. A pilot study is a smaller-scale version of a larger-scale investigation. A pilot study is also required to improve the reliability and usefulness of primary research (In, 2017; Sining et al., 2022). The accuracy of the target variables and the clarity of the instrument's language can be evaluated. Throughout the course of the pilot study, certain individuals should go through and examine the questionnaire (Aithal & Aithal, 2020; Hazzi & Maaldaon, 2015; Sining et al., 2022). The coefficient of dependability known as Cronbach's alpha is widely employed in the social sciences. Cronbach's alpha is used to determine the level of trustworthiness. It is a measure of the reliability of multi-item scales that calculates a coefficient of inter-item correlation by summing the correlations between individual items. The value of Cronbach's alpha ranges from 0 to 1, with higher values indicating greater reliability. Cronbach's alpha values between 0.70 and 0.80 have been indicated in the literature as appropriate (Pallant & Manual, 2011). The Cronbach's alpha value and level of reliability can be divided into five groups: very low (0.00–0.20), low (0.21–0.40), reasonable (0.41–0.60), high (0.61–0.80), and very high (greater than 0.80). Prior to getting the baseline data, the percentage of a pilot study sample should be 10% of the sample planned for the real study (Sining et al., 2022). This is so that Cronbach's alpha can be used to check how reliable the questionnaire is.

In this research, three sets of questionnaires were used, and a pilot study was conducted with 39 respondents from the academic staff, 20 respondents from the administrative staff, and 60 respondents from the students, representing approximately 10% of the actual sample size. The Cronbach's alpha reliability test was carried out. Table 3.13, Table 3.14, and Table 3.15 show the results of the Cronbach's alpha values for the questionnaires for academic staff, administrative staff, and students, respectively. From the results, each Cronbach's alpha value exceeded the minimum advised value of 0.6.

Table 3.13 : The results of the pilot study of the questionnaires for academic staff

Variable	Number of Questions	Cronbach's Alpha Coefficient
Job Satisfaction	13	.762
Fair Salary	20	.810
Equal Opportunity/Discrimination	14	.705
Health and Safety	22	.867
Social Benefits/Social Security	15	.872
Employment Relationship	16	.845
Sexual Harassment	13	.807

Table 3.14 : The results of the pilot study of the questionnaires for administrative staff

Variable	Number of Questions	Cronbach's Alpha Coefficient
Job Satisfaction	17	.714
Fair Salary	16	.715
Equal Opportunity/Discrimination	13	.713
Health and Safety	18	.751
Social Benefits/Social Security	12	.715
Employment Relationship	13	.757
Sexual Harassment	6	.720

The Cronbach's alpha varied from 0.762 to 0.872 for the questionnaires for academic staff and from 0.713 to 0.757 for the questionnaires for administrative staff.

Table 3.15 : The results of the pilot study of the questionnaires for students

Variable	Number of Questions	Cronbach's Alpha Coefficient
Health and Safety	19	.730
Feedback Mechanism	18	.846
Consumer Privacy	16	.811
Transparency	14	.741
End-of-Life Responsibility	14	.753

Additionally, the Table 3.15 explain that the Cronbach's alpha varied from 0.730 to 0.846 for the questionnaires for students. Therefore, the questionnaires are deemed adequate for use in gathering data for the actual study based on the results of the Cronbach's alpha test.

The clarity of the questionnaires for the subjects they are intended for needs to be verified. The goal of a pilot study is to confirm the suitability (Taber, 2018). In this study, each Cronbach's alpha coefficient for all three questionnaires is higher than 0.7. According to Cortina (1993), the reliability coefficient of variables is appropriate, as seen by the value of 0.7. A pilot study is thought to have a qualified research instrument if this value is obtained during the validation process.

3.5.8 Sample Size and Sample Technique

To gather information about a larger population, researchers often study a smaller, representative subset called a research sample. The accuracy of the conclusions drawn from the sample depends on how similar its individuals are to the broader population (Rudolph, 2015). The probability sampling technique was used in this study to attain representativeness because every individual is equally likely to be included in the sample. The sample size was calculated using the Krejcie and Morgan formula

(Krejcie & Morgan, 1970). The Table 3.16 show that the population of Kabul University is 23,452.

Table 3.16 : List of faculties at Kabul University and its population and sample size

Faculty	Academic Staff	Administrative Staff	Students	Total Population
Language and Literature	151	22	3,689	3,862
Economic	44	13	2,851	2,908
Law and Political Science	38	13	1,728	1,779
Public Policy and Administration	15	9	681	705
Psychology	38	13	1,203	1,254
Journalism	28	14	1,065	1,107
Sharia	59	14	1,375	1,448
Social Science	41	12	969	1,022
Fine Art	52	18	1,407	1,477
Engineering	83	26	1,401	1,510
Agriculture	83	40	1,946	2,069
Mathematics	25	8	478	511
Physics	18	9	500	527
Chemistry	26	14	448	488
Biology	19	13	407	439
Pharmacy	42	21	407	470
Computer Science	39	14	989	1,042
Veterinary	41	26	482	549
Environment	19	9	515	543
Geoscience	28	17	911	956
Total	889	325	23,452	24,666
Level 95% interval 5%	268	176	378	822

Based on the Kerjcie and Morgen (1970) formula, the required sample size is 655, ensuring a 5% margin error and 95% confidence interval. The stratification was based on the total population size of all universities in Kabul. In order to streamline the process of determining sample size, Krejcie and Morgan (1970) devised a table based on the sample size formula for a finite population, as presented in Equation 3.2.

$$S = X^2NP(1-P)/d^2(N-1) + X^2P(P-1) \quad \text{(Eq.3.2)}$$

Where:

S = the required sample size,

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (0.05),

N = the total population size,

P = the population proportion (assumed to be 0.5 as this could provide the maximum sample size), and

d = the degree of accuracy expressed as a proportion (0.05).

The Krejcie and Morgan (1970) formulation was utilized to determine the suitable number of samples required for this study. The sampling method by Krejcie and Morgan (1970) is one of the methods that is most comply applied for determining sample sizes. The probability sampling method is considered the most effective approach for this type of study, as it ensures that every individual has an equal chance of being selected as part of the sample. In this study, the sampling method was simple random sampling, which is a type of probability sampling. Respondents were chosen by a simple random sampling method to represent their organization's different departments.

For the workers (academic and administrative staff of Kabul University), the questionnaires were distributed to all 20 faculties. Based on the Krejcie and Morgan (1970) formulation, the sample sizes of at least 268, 176, and 378 respondents were determined for academic staff, administrative staff, and students, respectively, for sampling purposes. The distribution of questionnaires also involved the offices of the Chancellor, Vice Chancellor of Academic, Vice Chancellor of Administration and Finance Affairs, and Vice Chancellor of Student Affairs.

3.5.9 Data Collection

Data collection is an important step in inventory analysis. Data collection was conducted from 20th May 2022 to 15th December 2022 at Kabul University at all faculties and departments for workers (academic and administrative staff) and consumers (students).

The researcher addressed the questions to the enumerators and instructed them on how to answer them truthfully. Following that, each enumerator obtained sets of questionnaires to assist the researcher in distributing the questionnaires and collecting responses. The questions were completed in 10–20 minutes by the respondents. After the interviewees had filled out the questionnaires, the enumerator and the researcher looked at the questionnaires on the spot to see if any information was missing before collecting them one by one. Those with excellent academic backgrounds were chosen to act as the enumerators by the researcher. Five lecturers from the Faculty of Environment were assigned with the distribution of questionnaires among academics of Kabul University, three administrative staff were trained to distribute questionnaires among the administrative staff of Kabul University, and a lecturer from the Faculty of Environment and 12 final-year students were assigned and trained to distribute questionnaires among students. The survey was conducted under the direct supervision of the researcher at Kabul University. The self-administered questionnaires were filled out directly by the workers (academic and administrative staff) and consumers (students) at Kabul University. The researcher obtained permission from the Ministry of Higher Education and the Office of the Chancellor of Kabul University before conducting the data collection process. All three sets of questionnaires were written in English, but they were also translated into Dari, a local language, to make sure that the questions were understood by the participants.

3.5.10 Social Life Cycle Impact Assessment

Social life cycle impact assessment (SLCIA) is one of the stages involved in S-LCA, which seeks to evaluate and comprehend the possible social and socio-economic consequences associated with a product system (Bouillass et al., 2021). As per UNEP's (2020) definition, potential social impacts refer to the probable occurrence of a social impact resulting from the actions and the conduct of organizations connected to the product or service's life cycle, as well as the product's usage.

3.5.11 Stakeholder Social Issues Identification

In this research, descriptive analysis was utilized. This form of data analysis aids in the accurate description, presentation, or summarization of data points, enabling the development of patterns that meet each data requirement. This analysis was conducted to determine the frequency of a specific event or response in the variables of this study. This is the primary function of the frequency measure, which is to determine a count or percentage of those who concur or disagree and experience or do not experience the phenomenon. Simple descriptive coefficients characterize a particular dataset in descriptive statistics. In the end, it will be able to represent either the entire population or a representative sample of the population.

The selection of certain social indicators in this study was influenced by well-established frameworks in S-LCA, namely those delineated by UNEP (2020) and informed by SDGs. The selected indicators, namely freedom of association, fair salary, health and safety, and equal opportunity, are directly correlated with SDG 8 (Decent Work and Economic Growth) and SDG 10 (Reduced Inequalities).

The indicators were modified to suit the specific conditions of higher education in Afghanistan, taking into account important concerns such as job satisfaction, fair salary, and workplace safety. These problems were identified as crucial by local experts and stakeholders during initial discussions. In a post-conflict environment such as Afghanistan, these social factors are especially significant, as they involve the crucial tasks of restoring confidence in institutions and ensuring just and impartial treatment of workers and consumers.

The process of selecting indicators to quantify and compare various social consequences in social life cycle assessment (S-LCA) faces substantial methodological difficulties, especially in situations where there is a scarcity of data and intricate social dynamics (Traverso et al., 2021). Adapting global indicators to local contexts necessitates a meticulous examination of cultural and socio-economic aspects, which might impact the use and understanding of these indicators. For instance, although freedom of association is internationally acknowledged, its use and importance may vary in Afghanistan due to distinct legal and social structures.

3.5.12 Determination of the Stakeholders' Social Performance

3.5.12.1 Social Life Cycle Impact Assessment

The third step of social life cycle assessment (S-LCA) is the S-LCIA, which involves characterization and weighting. According to the UNEP 2020 guidelines, the reference point approach is used when the aim of conducting S-LCA is to assess the social performance of products (UNEP 2020). The reference unit for wage and income is AFs for Afghanistan. Other social indicators are presented in percentages.

The results of S-LCIA offer a crucial understanding of the social performance of the higher education system in Afghanistan. These findings have significant implications for achieving sustainability objectives at both local and global levels. This study adds to the wider discussion on social sustainability by evaluating factors such as fair salary and health and safety. It focuses specifically on post-conflict environments where it is crucial to rebuild trust in institutions and ensure fair treatment for all.

3.5.12.2 Characterization

All social subcategories evaluated in this study were adapted from the UNEP (2020) guideline. The inventory data were presented in percentages of "yes" or "no" responses for each question. All indicators were presented as percentages (Aparcana & Salhofer, 2013; Manik et al., 2013). The values for characterization results were between 0 and 100. In this study, the important social aspects adapted from the UNEP (2020) guideline were considered. The social aspects considered for academic and administrative staff were freedom of association and collective bargaining (job satisfaction), wage (fair salary), health and safety, equal opportunity/discrimination, employment relationship, and sexual harassment. Meanwhile, the social aspects considered for students were health and safety, feedback mechanism, consumer privacy, transparency, and end-of-life responsibility.

3.5.12.3 Normalization

Normalization is a process that simplifies comparisons between different social indicators. It is unnecessary when all units are the same (i.e., percentages) (Prasara-A et al., 2019).

3.5.12.4 Weighting

Some of the activities that need to be done are describing social problems, figuring out the weighting factor, and showing how social issues look. The inventory data for each indicator were broken down into percentages (Omran et al., 2021). The respondents responded "strongly agree" to "strongly disagree", and "yes" to all good items and "no" to all negative items. Each sign has a score between 0 and 100 that is based on the number of people who answered "strongly agree" to "strongly disagree", and "yes" or "no".

Using weighting measures, the social performance values of many social indicators related to the same social problem can be combined into a single value. Surveys were used to figure out the weighting factors, which were based on what stakeholders thought. On a scale from 0 to 10, the stakeholders were asked to rate how important the social indicator issues were to them. The overall weighting process is indicted in Equation 3.3, Equation 3.4, and Equation 3.5 as bellow:

$$\textbf{Weighting Factor} = \mathbf{AI/\Sigma I} \qquad \text{(Eq.3.3)}$$

Where:

Weighting factor = Weighting factor for each social issue,

AI = Average of importance scores from all expert panels, and

ΣI = Sum of the average of importance scores of all social issues within the same stakeholder group.

After obtaining the weighting variables for social indicators and social issues, the following formula was used to compute the weighted social performance of social indicators and social issues:

$$\mathbf{WIS} = \mathbf{AIS} \times \mathbf{Weighting\ factor} \qquad \text{(Eq.3.4)}$$

Where:

WIS = Weighted social performance of social issues,

AIS = Average score for all items for social issues, and

Weighting factor = Weighting factor for social issues.

The social performance of the categories was computed by adding the weighted social performances of all the social concerns as follows:

$$\boldsymbol{SPS} = \Sigma\mathbf{WIS} \qquad \text{(Eq.3.5)}$$

Where:

SPS = Social performance of categories, and

ΣWIS = Sum of weighted social performances of social issues within the same stakeholder group.

In the weighting step, experts applied weight to the normalized results to show the importance of each social aspect. The following steps were conducted for the assessment of social weighted social indicators, as adopted by (Prasara and Gheewala 2019):

1. Grading importance: Experts were asked to rate from 1 to 10 for each item. The weighting was conducted by inserting a weighting box beside each item in the questionnaires. The subcategory is considered more important if it has greater weight. Number 1 means least important and 10 is the most important.

2. Assessing the weighting factor for different indicators: The weighting factor for social subcategories was evaluated as the average social importance for each indicator and summarized to a value of one. This number shows the weighted factor for different social indicators.

3. Weighting different social indicators: After calculating the weighting factors for each social indicator, the weighting factor was multiplied by the indicator results to obtain the weighted performance indicator results. Finally, the weighted social performance for each stakeholder was evaluated by summing up the weighted social performance of all social issues for each stakeholder (Kalvani et al., 2022; Thuayjan et al., 2022).

The weighting factor in this study was evaluated using Eqs. 3.6 and 3.7, as adopted by (Kalvani et al., 2022):

$$\boldsymbol{WFi = \frac{MIi}{\Sigma Ii}} \qquad \text{(Eq.3.6)}$$

Where:

WFi = Weighting factor for each indicator,

MIi = Mean importance value from all experts for social index, and

ΣIi = Total mean importance value for all social indices for the same stakeholders.

$$\boldsymbol{WF = \frac{MI}{\Sigma I}} \qquad \text{(Eq.3.7)}$$

Where:

WF = Weighting factor for each social issue,

MI = Mean importance value from all experts for the special social issue, and

ΣI = Total mean importance value of all social indices for the same stakeholders.

Table 3.17 : Classification of results adapted from Sawaengsak (2019)

Weighted Index (WI)	Classification	Color Scheme
0 > WI > 20	Poor	
21 > WI > 40	Fair	
41 > WI > 60	Moderate	
61 > WI > 80	Good	
81 > WI > 100	Very good	

3.5.13 Interpretation

The weighted performance indicator results were presented from 0 to 100 to ease the interpretation. The weighted indicator results were classified into five classes between 0 and 100 (Sawaengsak et al., 2019), where the width of each class was 20. According to Table 3.17, the values of 0–20 show poor performance and are represented by red color, while the values 80–100 percentage show the best performance and are presented by dark green color. The meaning of the weighted index is illustrated in Figure 3.5.

Poor	Fair	Medium	Good	Very Good
0–20	21–40	41–60	61–80	81–100

Figure 3.5 : Classification of the social issues according to scores

In this study, the categorization method was employed to help determine and explain the findings. (Sawaengsak et al., 2019) provided the inspiration for this classification system, as shown in Figure 3.5. The social performances in the last part were put into groups and given scores from 0 to 100.

3.6 Scoring System

In this study, a scoring system was utilized to assess the sustainability of Kabul University as an HEI. The dimensions (environmental, economic, and social) were considered to have the same weight. However, the indicators chosen for these dimensions had varying percentages of contribution to the sustainability of the product under consideration. Using this scoring system, the inventory indicators gathered from each dimension were evaluated as a percentage. These inventory indicator results were then converted to numerical scores ranging from 0 to 4. Each indicator was assigned a score ranging from 0 to 4. The scale of the scores for negative indicators is defined as 0 points for 81–100%, 1 point for 61–80%, 2 points for 41–60%, 3 points for 21–40%, and 4 points for 0–20%. Meanwhile, the scale of the scores for positive indicators is defined as 0 points for 0–20%, 1 point for 21–40%, 2 points for 41–60%, 3 points for 61–80%, and 4 points for 81–100%.

For O-LCA, the results of the characterization step's subcategories are expressed in percentages (%). These percentages are calculated by comparing the values of each subcategory within the same impact category. In each damage category, the subcategory that releases the most non-environmentally friendly compounds received 100%, while other subcategories received a proportional percentage. The increase in the percentage of environmental indicators indicates that these indicators have a negative impact on the overall environmental impact (Kalvani et al., 2022).

For the critical discussion of the subjectivity of scoring Systems, although scoring systems offer a systematic method for evaluating sustainability, it is crucial to recognize their inherent bias. One of the advantages of this strategy is its capacity to condense intricate information into understandable ratings and enable comparisons. Nevertheless, there are constraints to the capacity to overly simplify intricate sustainability matters (Gasparatos & Scolobig, 2012). The scoring criteria in this study were created using a multi-step procedure regarding an examination of current sustainability assessment techniques in higher education. Experienced sustainability experts and academics were consulted regarding this matter.

The process of integrating various data from O-LCA, LCC, and SO-LCA into a unified sustainability assessment poses difficulties, especially when it comes to standardizing and merging quantitative and qualitative data. In order to address this issue, a complex and continuous procedure was implemented as follows:

1. Normalization: All indicators were standardized to a uniform scale ranging from 0 to 100% in order to facilitate comparison.

2. Categorization: The indicators were classified into three dimensions: environmental, economic, and social. Furthermore, a weighted mechanism was introduced to accurately represent the relative significance of various sustainability factors. The weights were established through consultation with experts and were adjusted to match the institutional priorities (Cinelli et al., 2014).

3. Aggregation: The weighted values were integrated within each component and then across dimensions to generate a comprehensive sustainability score. This approach enables a thorough assessment while also preserving the capability to analyze the specific components.

In order to improve the objectivity and dependability of the results, several approaches were implemented, such as utilizing numerous autonomous evaluators and assessing the consistency between their ratings, also known as inter-rater reliability. Sensitivity analysis is performed to evaluate the influence of various scoring thresholds (Foolmaun & Ramjeawon, 2013).

The range for the environmental scores was set up accordingly, with 0–20% would receive 4 points, 21–40% would receive 3 points, 41–60% would receive 2 points, 61–80% would receive 1 point, and 81–100% would receive 0 points. For LCC, the percentages of cost categories were determined by dividing the value of each cost effect category by the total cost and then multiplying the result by 100. If the cost impact group has a high percentage, it shows that it has a negative effect on the total economic impact. Once the results of the inventory indicators from the surveys were obtained for SO-LCA, each indicator was expressed in percentages. Later, these signs were turned into comparable scores, ranging from 0 to 4. Some of the signs had an opposite effect to what was anticipated. For instance, discrimination has negative social consequences. Therefore, the greater the percentage of this indicator, the more negative its social impact. The scoring scale for negative indicators was defined as follows: 0 points for 81–100%, 1 point for 61–80%, 2 points for 41–60%, 3 points for 21–40%, and 4 points for 0–20%. The inventory results were compiled into a singular score using equal weighting. The average ratings of indicators within the same subcategory were assigned to the subcategory in question. Then, the average ratings of the subcategories within the same level of impact category were assigned to the corresponding impact category. In the final stage, the scores of impact categories were averaged, and this score was then assigned to the total impact.

As per Table 3.18 the acquired percentages were classified into five ranges (from 0–20% to 21–40% to 41–60% to 61–80% to 100%) using the grading system created by Foolmaun & Ramjeawon (2013) and Omran et al. (2021). The indicators within each subcategory were given a score between 0 and 4, and the average of those scores was then allocated to that subcategory. Inventory indicators were distributed to the subcategory level with equal weighting. Indicators were categorized as either positive or negative based on their impact on the product's long-term viability. Indicators with a high value have a detrimental effect on sustainability, whereas those with low values have a favorable effect. The opposite is true for negative indicators; a high score on a discrimination indicator, for instance, suggests a more severe social impact. Negative indicators were given a score of 0 for 81–100%, 1 for 61–80%, 2 for 41–60%, 3 for 21–40%, and 4 for 0–20%. In the study, "social hotspots" referred to potential dangers or issues in the production process that fell under the studied impact subcategories.

Table 3.18 : Scoring systems adapted from Foolmaun and Ramjeawon (2013)

Indicator	Percentage (%)	Marks
Positive Indicators	0–20	0
	21–40	1
	41–60	2
	61–80	3
	81–100	4
Positive Indicators	0–20	4
	21–40	3
	41–60	2
	61–80	1
	81–100	0

3.6.1 Critical Discussion of the Subjectivity of Scoring Systems

Scoring systems provide a systematic method to assess sustainability, but it is crucial to recognize that they have inherent subjectivity. An advantage of this strategy lies in its capacity to compress intricate information into understandable ratings, thus allowing comparisons. Nevertheless, there are limitations on the ability to excessively simplify intricate sustainability issues (Gasparatos & Scolobig, 2012).

The scoring criteria in this study were established using a multi-step procedure, which involved a review of current sustainability assessment frameworks in higher education, followed by consultation with knowledgeable sustainability professionals and scholars, and adaptation to the unique context of Afghanistan higher education. In order to mitigate potential bias in weighting different factors, several strategies were applied, including utilizing multiple independent evaluators and assessing inter-rater reliability, conducting sensitivity analyses to assess the impact of different scoring thresholds, and integrating stakeholder feedback to ensure relevance.

The process of integrating different data from O-LCA, LCC, and SO-LCA into a unified sustainability assessment presents challenges, particularly in standardizing and unifying quantitative and qualitative data. To address this, a multi-stage process was utilized:

1. Normalization: All indicators were standardized to a unified and common scale (0–100%) to enable comparison.
2. Categorization: All indicators were categorized into environmental, economic, and social dimensions.
3. Weighting: A weighted mechanism was identified to reflect the relative significance of different sustainability aspects.
4. Aggregation: The weighted values were integrated within each dimension and then across dimensions to produce an overall sustainability score.

Therefore, this approach allows for a comprehensive assessment while maintaining the ability to analyze individual components.

In comparison with other sustainability assessment tools, this scoring approach has resemblances to other sustainability assessment tools employed in higher education, such as the sustainability tracking, assessment, and rating approach. It distinguishes itself by specifically concentrating on the integration of O-LCA, LCC, and SO-LCA data. This integration enables a more thorough evaluation of the implications of organizational sustainability, in contrast to methods that primarily concentrate on operational elements (Findler et al., 2019). The evaluation also took into account the compatibility of the grading system with the United Nations (UN) SDGs, ensuring that the assessment contributes to wider sustainability objectives in higher education (Lozano et al., 2015).

Among the limitations of the scoring system adopted are significant bias in stakeholder input and expert justification, problems in measuring complex and interrelated sustainability concerns through numerical scores, and limited comparability with other organizations and institutions due to specific context factors.

Future improvements may include improving stakeholder involvement in criteria establishment processes, applying adaptive weighting systems that evolve with the changing sustainability priorities, and exploring the use of artificial intelligence to promote objectivity in data integration and scoring.

3.7 Visualization of the Results

The main challenge to the broad use of OLCSA data is the complexities involved in presenting and analyzing them. Consequently, the OLCSA requires a meticulously structured presentation. Any comprehensive plan must consider not just the interaction between the three sustainability outcomes, but also the outcomes themselves. In order to address the requirement for conciseness in presenting the findings of OLCSA, a presentation strategy initially suggested by Kumar et al. (2007) was implemented and applied to the three sustainability scores obtained. This suggestion was also used by Backes et al. (2023) and Omran et al. (2021) in the study of palm oil using Microsoft Visio to visualize sustainability results. Georgakellos (1997) introduced the LCA polygon technique, which represents impact categories in a radial axis system. Additionally, the Microsoft Office 365 Excel's radar chart was chosen in this study to visualize the sustainability results of Kabul University.

The concept of strong sustainability explained, that the environmental, economic, and social dimensions of sustainability are interconnected and cannot be situated for one other, serve as the theoretical foundation for the sustainability triangle visualization technique (Finkbeiner et al., 2010). This approach is in line with the triple bottom line concept by Elkington & Rowlands (1999), which highlights the importance of taking into account all three dimensions of sustainability in a balanced manner.

The polygon in a hypothetical system of impact categories is a regular n-sided rectangle inscribed within a circle. Each radius of the circle serves as a decisive axis for the n-impact type. The sequential axes form equal angles based on the geometric shape. The point of intersection between the axes has a value of 0, while the point of intersection between the edges of the circle has a value of 10.

The focus of this study is the three elements of sustainability: the environmental, economic, and social dimensions. The sustainability triangle was employed to display the scores for the three dimensions. Using the Microsoft Office 365 Excel radar chart, the values of dimension scores were plotted on the respective axes. All scores are connected by a line to form a new three-sided triangle for visualization purposes. The area evaluation of the new triangle is used to determine the sustainability. Heron's formula was used to compute the triangular area (Ryan, 2016) as below in Equation 3.8, and Equation 3.9:

$$\textbf{Area} = \sqrt{\boldsymbol{S(S-A)(S-B)(S-C)}} \tag{Eq.3.8}$$

$$\boldsymbol{S} = \frac{\boldsymbol{A+B+C}}{\boldsymbol{2}} \tag{Eq.3.9}$$

Where a, b, and c represent the lengths of each side of the triangle, respectively. The equation was utilized to compute the area of the primary triangle X, Y, and Z, where the perimeter of the triangle is equal to 4. Additionally, the equation was employed to determine the area of the new triangle ABC. It is worth noting that the larger the area of the triangle, the more favorable the sustainability performance of the product.

3.7.1 Interpretation of Sustainability Triangle

The sustainability triangle provides a visual representation of an organization's performance through combined environmental, economic, and social dimensions. The shape and size of the triangle provide useful insights into the balance and overall sustainability of the organization. Different triangle shapes can be interpreted as follows:

1. Balanced triangle: A relatively equilateral triangle indicates equal performance across all three dimensions (environment, economy, and social). This indicates that sustainability should be approached holistically, with no single dimension significantly outperforming or lagging behind the others
2. Extended triangle: An elongated shape suggests dominance in one or two dimensions. A triangle elongated toward the environmental axis, for instance, would suggest aggressive environmental measures, but perhaps at the price of social or economic concerns. Meanwhile, an elongation toward the economic axis could suggest a focus on financial performance, possibly overlooking environmental or social aspects.
3. Compressed triangle: There is a lot of space for improvement in sustainability practices when the triangle is narrow and compressed, indicating poor performance overall in all dimensions.

3.8 Conclusions

This chapter provides an extensive framework for obtaining the OLCSA of Kabul University. The methodology encompasses the social, economic, and environmental dimensions of sustainability. The assessment applies three methodologies: O-LCA, SO-LCA, and LCC. Each methodology contributes distinctively to comprehensive perceptions of sustainability performance. This framework is based on the principles of strong sustainability, which highlights the interconnectedness of environmental, social, and economic aspects. The study design comprises three primary elements: OLCA, SO-LCA, and LCC. In addition, the study's methodology is based on well-established recommendations, such as ISO/TS 14072 for OLCA and UNEP/SETAC guidelines for S-LCA. The study employs a gate-to-gate methodology to evaluate the environmental effects of the university, specifically targeting its fundamental academic operations. The study realizes the complicated nature of quantifying the indirect impacts of research, learning, and teaching activities, particularly in the context of a developing country such as Afghanistan. Essential components of the technique comprise a comprehensive delineation of the system boundaries of Kabul University, which includes its core operations and excludes any external organizations; an extensive review of the LCI, taking into account several variables such as the number of students and staff, degree programs, funding, and infrastructure; the determination of pertinent effect categories for conducting environmental and social evaluations specifically designed for the higher education sector; and an exacting methodology for acquiring data, which involves creating and verifying questionnaires to acquire social impact data from important individuals, such as workers and students. This involves incorporating LCC components that are tailored to educational institutions, utilizing pertinent literature, and customizing them to fit the Afghan setting. The chapter emphasizes the significance of content validity in questionnaire design, utilizing experts' reviews to guarantee the pertinence and comprehensiveness of the survey instruments. This method enhances the dependability and accuracy of the process of gathering data. The involvement of stakeholders is crucial in the creation of data collection tools, guaranteeing the accuracy of the material and improving the dependability of the results. Additionally, the research design recognizes the distinct difficulties of implementing OLCSA at an HEI, specifically in regard to determining suitable functional units and resolving data deficiencies. The study's approach to these difficulties exhibits a sophisticated comprehension of the intricacies associated with sustainability evaluation in the educational sector. The consolidation of data from O-LCA, SO-LCA, and LCC is accomplished by employing normalization and a weighting technique to accurately represent the relative significance of each sustainability component. Despite this thorough assessment, there are still several limitations, such as possible biases in scoring and difficulties in ensuring data quality and availability. This research aims to provide a comprehensive assessment of Kabul University's sustainability performance with regard to internal decision-making, performance tracking, and communication of sustainability endeavors. This extensive evaluation is anticipated to produce significant observations for internal decision-making, performance tracking, and communication, perhaps acting as a blueprint for other HEIs in Afghanistan and beyond. The methodology described in this chapter establishes the foundation for a comprehensive and methodical assessment of Kabul University's sustainability profile. This assessment contributes to the wider field of sustainability evaluation in higher education and provides a framework that can be customized and improved for similar institutions worldwide. Finally, future studies should concentrate on improving the LCC method for use in HEIs and investigating how the OLCSA framework can be utilized in a variety of educational settings and universities.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Assessment of Organizational Life Cycle Assessment to Evaluate the Environmental Impacts of Kabul University

This chapter provides an analysis of the environmental performance results of Kabul University, which serves as a case study for higher education institutions (HEIs) in Afghanistan. The analysis focuses on the outcomes of the reporting organization in 2020 and includes a thorough investigation of several scenarios evaluated in this study.

Table 4.1 displays the environmental impacts of Kabul University's academic activities in 2021, considering the life cycle inventories in Table 3.2, which are organized based on the ReCiPe 2016 impact assessment technique. The results are categorized into three harm classifications: human health, ecosystem, and resources.

The main impact on human health stems from the creation of fine particulate matter, which is quantified by a disability-adjusted life year (DALY) value of 16.2356596. This impact is most likely a result of the emissions produced by the university's energy consumption, transportation, and other activities related to its operations. The impact of global warming on human health is significant, with a value of 8.56378089. The assessment of the overall burden of disease is conducted through the utilization of DALY.

Table 4.1 : The total environmental impacts of the academic activities of Kabul University in 2021 based on the ReCiPe 2016 impact assessment method and classification based on damage categories

Impact Category	Sub-Category	Unit	Results of Life Cycle Assessment
Human Health	Stratospheric ozone depletion	DALY	0.00155134
	Ionizing radiation	DALY	0.00471964
	Ozone formation, human health	DALY	0.01438193
	Water consumption, human health	DALY	0.14768179
	Human carcinogenic toxicity	DALY	0.26969363
	Human non-carcinogenic toxicity	DALY	0.42604136
	Global warming, human health	DALY	8.56378089
	Fine particulate matter formation	DALY	16.2356596
Ecosystem	Water consumption, aquatic ecosystems	species.yr	4.6007E-08
	Marine eutrophication	species.yr	8.0365E-08
	Global warming, freshwater ecosystems	species.yr	7.0594E-07
	Marine ecotoxicity	species.yr	1.7016E-06
	Freshwater ecotoxicity	species.yr	2.8811E-06
	Terrestrial ecotoxicity	species.yr	0.00015637
	Land use	species.yr	0.0008575
	Water consumption, terrestrial ecosystems	species.yr	0.00154018
	Freshwater eutrophication	species.yr	0.00119716
	Ozone formation, terrestrial ecosystems	species.yr	0.00205289
	Terrestrial acidification	species.yr	0.00966604
	Global warming, terrestrial ecosystems	species.yr	0.02584017
Resources	Mineral resource scarcity	USD2013	3,882.65201
	Fossil resource scarcity	USD2013	294,349.291

Furthermore, the ecosystem impacts in damage categories are often less significant in comparison to the impact on human health. Based on Table 4.1, the organizational life cycle assessment (O-LCA) findings have important ramifications for the operations and sustainability plans of Kabul University. The significant influence on the production of fine particulate matter and global warming indicates that the university's energy use and mobility policies require immediate attention. These results are consistent with the larger problems encountered by universities in poor nations, where a lack of infrastructure frequently forces them to rely on energy sources derived from fossil fuels. (Ferreira, Lo-Iacono et al., 2017)

Marine eutrophication has a profound impact on the ecosystem, with a value of 8.0365E-08 species.yr. Other than that, ecosystem degradation is also caused by global warming, freshwater ecosystems (7.0594E-06 species.yr); water consumption, aquatic ecosystems (4.6007E-08 species.yr); freshwater ecotoxicity (2.8811E-06 species.yr); and also marine ecotoxicity (1.7016E-06 species.yr). Meanwhile, the impacts of terrestrial ecotoxicity; land use; water consumption, terrestrial ecosystems; freshwater eutrophication; ozone formation, terrestrial ecosystems; terrestrial acidification; and global warming, terrestrial ecosystems due to the academic activities of Kabul University are relatively lower.

Based on the Table 4.1, the exhaustion of fossil fuels is the most notable consequence in the fuel category, amounting to a cost of 294,349.291 USD2013. This effect is probably a result of the university's dependence on fossil fuels for transportation and energy. There is also a concern about the scarcity of mineral resources, which amounted to 3,882.65201 USD2013. A similar result was obtained by Jürgens et al. (2023) in the study of O-LCA of a university as an HEI.

Consequently, the life cycle assessment (LCA) results emphasize how crucial it is for Kabul University to take action on its environmental effects, specifically in the domains of air pollution, greenhouse gas (GHG) emissions, and resource depletion. Adopting sustainable practices, such as implementing energy-efficient measures, utilizing renewable energy sources, and implementing waste reduction methods, might contribute to alleviating these impacts.

For further discussion, the impact characterization demonstrates the proportional contribution of each impact category. However, it is not possible to directly compare the corresponding categories because they display the relative distribution within each category, rather than the actual amount.

Comparing these results offers important context for other academic O-LCA studies. For example, Lo-Iacono-Ferreira et al. (2017) discovered that energy use accounted for 70–80% of all environmental impacts in Spanish colleges, making it the main contributor to those impacts. On the other hand, the analysis reveals a more equitable distribution of the impacts among building operations (19.5%), transportation (24.7%), and energy (55.8%). This discrepancy can be related to the particular difficulties Kabul University faces, such as its inadequate public transit system and reliance on diesel generators for energy.

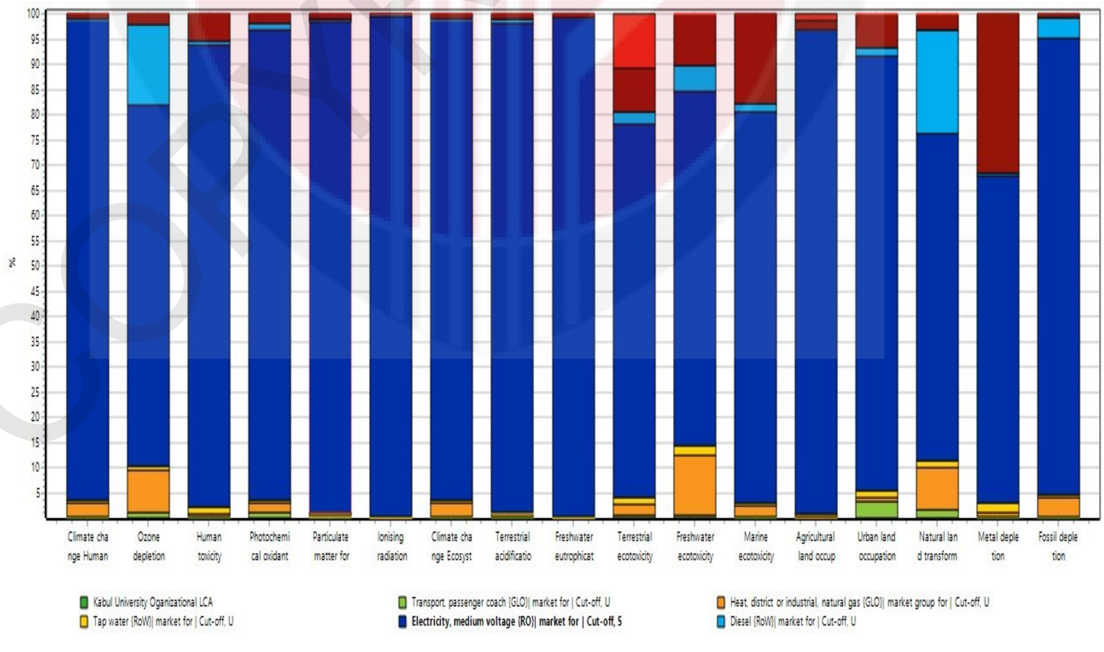

Figure 4.1 : Contribution of environmental impact categories

Figure 4.1 illustrates the extent to which various areas of operations at Kabul University contribute to specific impact categories. The primary factors that contribute significantly are electricity, transportation activity, and building operations (hostels). Electricity is responsible for the majority of the impact in all 22 categories.

Based on Figure 4.1 and using the data in Table 4.1, the impacts of the O-LCA on Kabul University were analyzed. According to the contribution to global warming, the university operations have a substantial impact on global warming in five areas: water consumption, aquatic ecosystems, marine eutrophication, global warming, and freshwater ecosystems. The primary factors responsible for these effects are electricity, transportation (namely passenger coaches), and building operations (specifically hostels).

Fine particulate matter, global warming, and human health, which have negative impacts, are mostly attributed to electricity and transport operations. This underscores the necessity for implementing renewable energy and sustainable transportation options within the university.

The generation of fine particulate matter (0.033826655 DALY) and the influence of ozone formation on human health (0.000196331 DALY) and terrestrial ecosystems (2.82039E-05 species.yr) are major issues. According to Abbass et al. (2021), the consequences are primarily caused by transportation and construction activities.

University operations have a measurable influence on human carcinogenic toxicity (0.26969363 DALY), human non-carcinogenic toxicity (0.42604136 DALY), and different ecotoxicity impacts. The harmful implications primarily stem from electricity usage and transportation (Wilson, 1995). The impacts of fossil resource scarcity (valued at 294,349.291 USD2013) and mineral resource scarcity (valued at 3,882.65201 USD2013) are significant, which are mostly caused by transportation, electricity usage, and building operations. This highlights the significance of shifting toward renewable energy sources and advocating for resource efficiency (Hassan et al., 2024).

Based on the general evaluation, the organization excels in numerous subcategories, particularly those pertaining to water usage, toxicity, and diverse environmental consequences. Nevertheless, there are notable aspects that require enhancement, such as the formation of fine particulate matter, the impact of global warming on human health, terrestrial ecosystems, and freshwater ecosystems. Terrestrial acidification refers to the process of increasing acidity in land ecosystems.

It is critical to recognize the limits of the data's quality and any potential uncertainties in the O-LCA findings. To address this, the method described by Heijungs & Huijbregts (2004) was used and a Monte Carlo simulation was performed to evaluate the reliability of the results. Based on the results of the simulation, there was a moderate degree of uncertainty in the confidence ranges for the two primary impact categories (the creation of fine particulate matter and global warming), with ±15% and ±12%, respectively. The main source of these uncertainties is a lack of data in the estimates and records of energy consumption related to transportation.

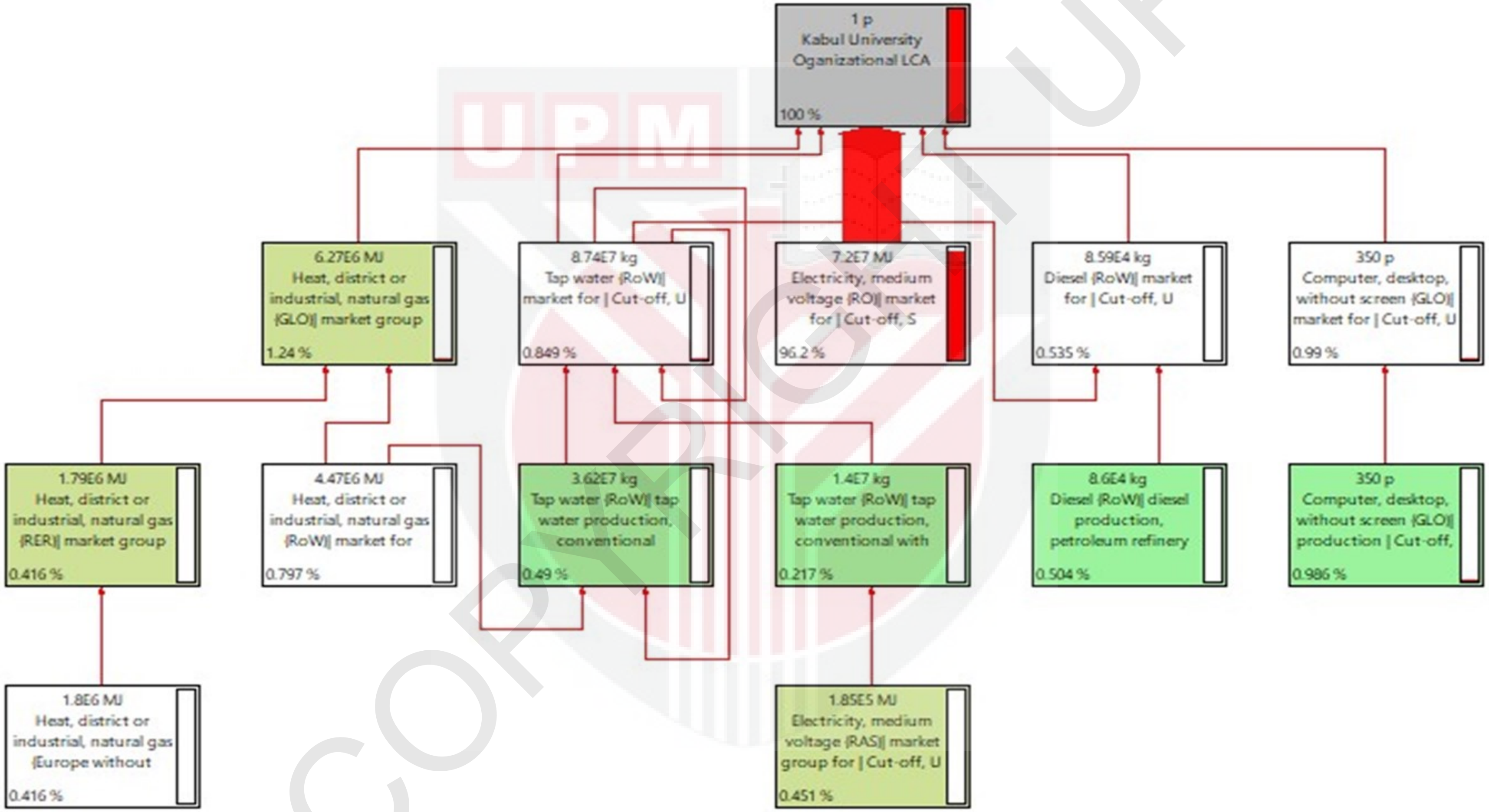

Figure 4.2 : The tree diagram of Kabul University indicating organizational impacts generated using SimaPro software

Using the data from the O-LCA results shown in Figure 4.2, the environmental impacts of Kabul University's activities can be examined in the following manner: The tree diagram unambiguously illustrates that energy consumption is the predominant factor in the university's environmental impact, constituting 55.8% of the overall impact. Transportation accounts for 24.7% of the total impact, while building operations, notably hostels, make up 19.5%. The sum of these three categories accounts for the entire 100% of the evaluated impact.

The significant proportion of electricity use (55.8%) highlights the university's principal concern regarding energy usage. This is consistent with the results of other research on the environmental effects of universities, such as the study conducted by Jürgens et al. (2023), who also found electricity as a significant factor in their analysis of the LCA of an HEI.

The transportation sector's contribution of 24.7% indicates substantial effects resulting from commuting and other activities related to transportation. These findings align with the research conducted by Abbass et al. (2020), which revealed that mobility has a significant role in causing environmental harm in university environments, namely in terms of air pollution and GHG emissions.

Building operations, particularly the inclusion of dormitories, make up 19.5% of the overall contribution, underscoring the need to incorporate residential facilities into sustainability initiatives at universities. This particular component is frequently disregarded in conventional LCA research, but it is effectively addressed in this approach known as O-LCA.

The comprehensive assessment is facilitated by the tree diagram, which offers a lucid representation of the varying degrees of influence that different university operations have on its total environmental impact. The comprehensive nature of O-LCA is highlighted as a significant advantage by Tiago (2024) in their evaluation of environmental impact assessments in HEIs.

Several ways to reduce the damage can be suggested based on the areas that have been found:

1. Energy efficiency: Using lighting; heating, ventilating, and air conditioning systems; and appliances that use less energy could reduce power use and the problems that come with it by a large amount. Findler et al. (2019) stated that these kinds of steps have helped universities save 20–30% of their energy in a variety of situations.

2. Renewable power: The Kabul University could cut its carbon impact by a large amount by switching to renewable energy sources like solar photovoltaic systems. This is especially important because Afghanistan has a lot of solar potential (Ershad et al., 2016).

3. Sustainable transportation: Promoting carpooling, making it easier to use public transportation, and encouraging cycling could help reduce the damage that traveling does. In a study of 70 colleges and universities by Lozano et al. (2015), these kinds of programs cut pollution from transportation by 15–25%.

4. Green building practices: Building operations, especially hostels, could use less energy and resources if they used green building practices like better insulation, natural airflow, and water-efficient fixtures. These strategies should be put into action based on how they might work and how much effect they could have on Kabul University and the Afghan higher education system as a whole.

This comprehensive O-LCA of Kabul University not only provides useful suggestions for improving the environmental performance of Kabul University, but also contributes to the larger comprehension of sustainability concerns in HEIs in post-conflict countries like Afghanistan. The results emphasize the necessity for tailored solutions that consider individual circumstances, as well as the significance of tackling both direct factors (e.g., energy usage) and indirect factors (e.g., commuting) that contribute to the environmental impacts in the university's sustainability initiatives.

4.1.1 Comparative Analysis and Uncertainty Assessment

Compared to the study by Lo-Iacono-Ferreira et al. (2017) on Spanish universities, Kabul University's environmental impacts on energy consumption is about 25% higher than that of the Spanish universities. This difference may be due to the university's reliance on diesel generators and less energy-efficient infrastructure. Considering the result of O-LCA in Table 4.1, the 70–80% energy effect observed in Spanish institutions, the analysis shows a fairer distribution of impacts across building operations (19.5%), transportation (24.7%), and energy (55.8%). This difference most likely reflects the unique challenges Kabul University faces, notably its reliance on diesel generators and poor public transportation.

A study by Jürgens et al. (2023) on a German university discovered that transportation contributed only 15% of all environmental impacts, lower than Kabul University's 24.7%. This distinction emphasizes that, in the Afghan context, better environmentally friendly transportation solutions are required.

For uncertainty analysis, using the technique outlined by Heijungs & Huijbregts (2004), two main impact categories of fine particulate matter generation and global warming impacts in the simulation resulted in confidence ranges of ±15% and ±12%, respectively. These moderate degrees of uncertainty are mostly caused by gaps in transportation-related energy consumption statistics.

4.1.2 Data Quality and Limitations

In terms of limitations and data quality, it is crucial to recognize the significant uncertainties in the O-LCA findings, as well as the limitations in the data quality. There are several data gaps due to the difficult circumstances of conducting research in a post-conflict setting like Afghanistan, especially in the accurate energy consumption statistics for transportation.

Furthermore, regarding future research directions, these results highlight the need for broader data collection mechanisms in Afghan universities. Future research ought to concentrate on formulating resilient approaches for assessing environmental impacts in environments with limited resources, probably by utilizing technology like remote sensing to obtain more precise data.

4.2 Assessment of Economic Impacts

Life cycle costing is an economic assessment approach that evaluates the total cost of production throughout the entire life cycle of a product. This includes the costs associated with raw materials, installation of production equipment, operation, maintenance, and the product's end-of-life (De Menna et al., 2018). Although life cycle costing (LCC) offers useful insights, it is crucial to critically analyze the findings and incorporate them with environmental and social assessments in order to comprehend the wider implications of sustainability.

Life cycle costing is an economic analysis method that uses a life cycle perspective to assess the entire cost of production incurred during a production process, beginning with the provision of raw materials, installation of production equipment, operation, and maintenance tools, and ending with the end of the product life cycle (Silva Lora et al., 2011). Furthermore, LCC is concerned with economic rather than environmental consequences. The selection of LCC indicators is based on the methodology's major references for addressing product LCC and revenues (De Menna et al., 2018; Gundes, 2016).

The LCC analysis conducted in this document offers a comprehensive overview of the expenses related to Kabul University. Nevertheless, the sensitivity analysis is constrained and fails to comprehensively investigate the spectrum of economic situations pertinent to Afghanistan's unstable economic environment. In order to tackle this issue, the scope of the sensitivity analysis was broadened to encompass a broader spectrum of economic situations, taking into account various discount rates and time horizons. This method is consistent with the discussions of social discount rates in sustainability evaluations, as outlined by Stern (2007).

In this study, all costs were calculated from the university's property assets until the operation costs. Meanwhile, in LCC, the inventory phase involved the categorization of all gathered economic data into several cost categories. The impact categories (fixed and variable costs) were the land and property costs, water costs, energy costs, maintenance costs, and operation costs. The reporting unit is the student in the university. The total number of students in the university is 23,452 students. Based on the regulation of the Ministry of Higher Education, the students should graduate in 4–6 years' time period. The whole costs of Kabul University's services for the expenses in the year 2020 were calculated.

Table 4.2 : Life cycle inventory costs in AFs

Impact Category	Indicators	Costs (AFs)	Total Costs	Percentages
Land and Property Costs	Property costs Construction	2,436,840,000 23,623,394	2,460,463,394	78.69% 0.29%
Water Costs	Water	4,710,712	4,710,712	0.15%
Energy Costs	Fuel Electricity	11,833,278 8,001,975	19,835,253	0.38%
Maintenance Costs	Maintenance and renovation	10,561,065	10,561,065	0.34%
Operation Costs	Transportation Office-related Communication Municipality Hostel Salaries	69,996,368 3,415,251 4,443,289 18,446,296 48,548,755 1,117,865,883	1,262,715,842	20.14%
Total Costs (AFs)			3,758,286,266	

The results of LCC show in Table 4.2 that the major costs for Kabul University are the property costs, which are 78.69% of the whole cost of the university. The operation costs are the second highest cost at Kabul University with 20.14%, followed by energy costs (0.38%), maintenance costs (0.34%), construction costs (0.29%), and water costs (0.15%). However, when the calculation of the costs of Kabul University did not include the property costs, the main contributor was the operation costs, which are 94.52% of the whole cost of the university. The energy costs, water costs, maintenance costs, and construction costs are also contributed by the graduation of students in 6 years at Kabul University.

4.2.1 Summary of the Total Cost and Payback Period of 4 Years for Kabul University

In order to make meaningful comparisons between future cash flows, present value estimates are routinely utilized in the business and economic worlds. Net present value (NPV) refers to a calculation made by discounting future cash flows. When evaluating the profitability of a project, an NPV is the standard instrument used by businesses. It could be a solid option for investors weighing their options (San Ong & Thum, 2013; Steiger, 2010; Yan et al., 2020). Table 4.3 lists the total costs and NPV for 4-year graduation at Kabul University.

Table 4.3 : Summary of the total costs and payback period of 4 years for Kabul University

Impact Category	Cost Contribution with Properties (AFs)		Cost Contribution without Properties (AFs)	
Initial/Property Costs	2,436,840,000	78.69%		
Construction Costs	9,069,618	0.29%	9,069,618	1.37%
Maintenance Costs	10,561,065	0.34%	10,561,065	1.60%
Energy Costs	11,833,278	0.38%	11,833,278	1.79%
Water Costs	4,710,712	0.15%	4,710,712	0.71%
Operation Costs	623,710,230	20.14%	623,710,230	94.52%
Total Costs (AFs)	**3,096,724,903**	100%	**659,884,903**	100%
Net Present Value 20%	**16,851,138,232.16**		**3,590,829,688.16**	

Based on Table 4.3, calculating the total costs and NPV is AFs 3,096,724,903 is the total cost with property included, while AFs 659,884,903 is the total cost without property. When property costs are included (AFs 16,851,138,232.16) as opposed to excluded (AFs 3,590,829,688.16), the NPV at a 20% discount rate is substantially higher. This table offers a thorough financial analysis that identifies the main expenses related to the operations and infrastructure of the university. Findings shows, property costs have a major influence on overall costs, but when property is excluded from the equation, operating costs take center stage. The investment appears to be economically feasible during the four-year payback period.

4.2.2 Sensitivity Analysis of Life Cycle Costing

The details of the estimated LCC related to Kabul University as an HEI in Afghanistan are shown in Table 4.4 Discount rates of 20%, 40%, and 50% were applied to determine the NPV. The selection of these discount rates for the sensitivity analysis is made based on various aspects, especially those applicable to the Afghan context. First, these rates indicate the significant levels of economic uncertainty and risk that are widespread in countries after a conflict. Collier & Gunning (1995) observed that post-conflict countries generally face elevated discount rates as a result of heightened subjective risk and uncertainty. Furthermore, the fluctuations in Afghanistan's economy are related to political situations and monetary policy, which significantly fluctuate. Considering this inherent instability, employing a spectrum of discount rates extending up to 50% enables a thorough examination of prospective economic situations. Furthermore, Zhuang et al. (2007) proposed that the social discount rates in poor countries might vary between 8% and more than 15%, with larger rates typically used in situations of greater uncertainty. The inclusion of 20%, 40%, and 50% rates in this research allows for a wide range of economic scenarios that Kabul University may encounter, including both moderate and extreme situations.

The results show that the costs at Kabul University seemed to be quite sensitive to the shifting of discount rates. The higher the discount rates, the higher the NPV. Even though the NPV increased with increasing discount rates, the payback period is similar to the NPV. There is no consensus on which discount rate should be utilized for an

LCC. Thus, a sensitivity analysis for various discount rates is recommended (UNEP, 2011).

The sensitivity analysis demonstrates how different discount rates affect the NPV and PBP of Kabul University. Considering the data presented in Table 4.4, when the discount rates increased by 20%, 40%, and 50%, the NPV also increased. These findings align with Stern (2007), where the choice of suitable discount rates is crucial in sustainability assessment. Varying discount rates can have a substantial impact on the perceived financial feasibility of long-term investments, such as those made in higher education.

Table 4.4 : Sensitivity analysis of LCC results (discount rate)

Kabul University	Normal Value	Increased by 20%	Increased by 40%	Increased by 50%
NPV	AFs 3,096,724,903	29,016,064,603	27,702,062,292	34,644,609,852
PBP	USD	6	6	6
NPV	29,542,755.57	24,556,780,743	44,356,992,035	58,160,364,584
PBP		5	5	5
NPV		16,851,138,232	50,426,572,844	65,127,995,616
PBP		4	4	4

Based on the Table 4.4 by analyzing the sensitivity of LCC statistics for Kabul University, the results of cost per student can be examined. In the initial situation, the NPV of AFs 3,096,724,903 or approximately USD 29,542,755 is the total cost of the university operations over its whole lifespan. In order to determine the cost per student, it is necessary to have information on the total number of students, which is not included in the provided data. In this study, the number of total students is 23,452. Based on calculations, a student at Kabul University spends AFN 132,046.24 per year.

Therefore, for a student who graduated in four years from Kabul University, the total expenditure amounts to AFs 528,184.95 (USD 7,449.16).

In response to alterations in discount rates, the analysis demonstrates the impact of increasing the discount rates by 20%, 40%, and 50% on the NPV. This is consistent with the findings of Johnstone & Marcucci (2010), who examined the instability of funding for higher education in emerging nations. Psacharopoulos & Patrinos (2018) highlighted the significance of using NPV calculations to assess educational investments, particularly in situations with limited resources. This exemplifies the university's fiscal responsiveness to economic variables. However, the PBP remains consistent at 6 years for the base scenario and reduces to 5 years and then 4 years when the discount rate increases. This implies that an increase in discount rates results in a more rapid improvement of investments, which may influence the cost structure per student. These findings align with Woodhall et al. (2004), who emphasized the importance of PBP in evaluating the economic feasibility of educational initiatives in developing nations.

For the financial consequences per student, as the NPV rises with greater discount rates, the potential cost per student would correspondingly increase, assuming that the number of students remains constant. For instance, when the discount rate increased by 50%, the NPV increased to AFs 34,644,609,852. This would result in a substantial increase in the cost per student compared to the basic case.

Financial planning refers to the process of creating a strategy to manage and allocate financial resources in order to achieve specific goals and objectives. Sensitivity analysis aids the university in comprehending the potential impact of economic fluctuations on its long-term financial viability and, therefore, the cost framework for students.

A university can use information about these cost sensitivities to inform decisions about how resources are distributed, which could impact the quality and affordability of education for students. In order to precisely ascertain the cost per student, supplementary details are needed, including the overall student count and the allocation of expenditures across various university operations. This research offers a structure for comprehending the financial dynamics of the university, which ultimately influences the fee structure for individual students. The analysis holds special relevance for universities situated in least-developed countries. According to the United Nations Environment Program (UNEP) (2011), it is essential to comprehend the financial vulnerability of educational institutions in order to promote sustainable growth in these areas.

The cost for a student who graduated from Kabul University in six years is AFs 792,277.4232, which is approximately USD 11,173.74, followed by AFs 660,231.186 (USD 9,311.45) for five years, and AFs 528,184.9488 (USD 7,449.16) for four years. Sensitivity analysis is necessary to predict the outcome of a decision. Nevertheless, it is important to contextualize these figures within the broader economic landscape of higher education in developing countries. Specifically, Psacharopoulos & Patrinos (2018) emphasized that developing countries tend to have greater return on investment in education, which justifies the higher initial expenses.

Consequently, this sensitivity study offers vital insights into the financial dynamics of Kabul University. This illustrates the susceptibility of the institution's finances to fluctuations in the economy, which is especially significant in the context of a developing nation like Afghanistan. The research adheres to accepted protocols in higher education finance and serves as a basis for making well-informed decisions about how resources should be allocated to ensure long-term financial stability.

It is essential to integrate economic costs with environmental and social assessments in order to gain a comprehensive knowledge of sustainability. The LCC study reveals that the primary factors driving the overall costs of Kabul University are the costs related to properties and operations. These costs have substantial environmental and social impacts. For example, the university's environmental impact is evident in its high energy and water costs, while its operational costs, such as salaries and transportation, have an impact on the local economy and community (Findler et al., 2019). An examination of these relationships facilitates the identification of possible trade-offs and synergies among the economic, environmental, and social aspects.

Finally, the enduring economic viability of Kabul University depends on variables such as consistent funding and congruence with economic development objectives. Securing financing sources in a turbulent economic setting like Afghanistan is a tough task. Examining the economic performance of Kabul University in relation to benchmarks from other universities or industries might offer significant contextual information. Xue et al. (2020) emphasized the significance of benchmarking in comprehending the comparative effectiveness and pinpointing areas that require enhancement. Securing long-term economic viability necessitates the implementation of a well-thought-out strategy and ongoing assessment of financial outcomes.

4.2.3 Integration of Economic Costs with Environmental and Social Impacts

The LCC analysis of Kabul University shows significant relationships between economic costs and social and environmental impacts, which can be explained as follows:

1 Operational costs: Significant energy consumption is directly associated with high operating costs, which make up 20.14% of the total costs (or 94.52% when property costs are excluded). The O-LCA data, which reveal that electricity is responsible for 55.8% of all environmental impacts, demonstrate how significantly this energy use contributes to the university's environmental impact. This points to a possible area where improvements in environmental and economic performance could work. Adopting energy-saving strategies could lower operating expenses and has a positive environmental impact simultaneously (Findler et al., 2019).

2 Transportation costs: Transportation is a major contributor to operational costs and has an impact on the economy and the environment. According to the O-LCA data, transportation contributes significantly to operating costs and accounts for 24.7% of environmental impacts. This emphasizes the importance of finding affordable, environmentally friendly transportation options (Lozano et al., 2015).

3 Maintenance costs: Although maintenance costs represent only 0.34% of the total costs, they are important to the durability and effectiveness of university's infrastructure. Over time, proper maintenance can result in decreased environmental impacts and increased energy efficiency, proving a long-term relationship between environmental performance and economics (Omran et al., 2021).

4 Social implications: There are important social impacts on the large percentage of expenses that go into salaries, which are a component of operating costs. It illustrates how the university supports regional economic growth by serving as a significant employer in the area. In addition, this also emphasizes the importance of allocating resources effectively in order to guarantee both equitable equal compensation and long-term financial viability.

This integrated analysis of economic, environmental, and social aspects aligns with the triple bottom line approach for evaluating sustainability (Elkington & Rowlands, 1999). This illustrates that actions focused on cost reduction can have a significant influence on both environmental sustainability and social impacts, and vice versa. Investments in renewable energy sources, despite the possibility of higher initial expenses, have the potential to result in a long-term reduction of both operational costs and environmental impacts.

4.3 Evaluation of Social Impacts

This section examines the social implications of Kabul University as an HEI within the context of Afghanistan. As previously stated in earlier sections, the social organizational life cycle assessment (SO-LCA) methodology is capable of evaluating the social consequences generated across the whole life cycle of a product. The current research utilized the approach of SO-LCA as opposed to S-LCA due to the organizational perspective offered by the O-LCA. This choice was made in order to address certain limitations associated with S-LCA, such as the complexity of incorporating social dimensions, the need for methodological enhancements, and the lack of originality. These challenges and limitations are evident in the procedural and practical aspects of S-LCA (Martínez-blanco et al., 2015; Sining et al., 2022).

Furthermore, the examination of social variables, including child labor and forced labor, holds significant importance when conducting a SO-LCA (UNEP, 2020). A management assessment conducted at the organizational level may exhibit a higher level of detail compared to an evaluation conducted at the product level. Life cycle assessment is a method that specifically focuses on evaluating the actions and performance of an organization (Martínez-blanco et al., 2015).

Hence, it presents a potential avenue for leveraging the benefits of S-LCA in relation to goods and organizations, thereby enhancing the well-being of stakeholders throughout the value chain. Social organizational life cycle assessment is a methodology that enables the measurement of crucial yet challenging social elements through the use of performance measures, thus allowing for the quantification of the entire life cycle (Karlewski et al., 2019). The SO-LCA method, as described by Martínez-blanco et al. (2015), offers a comprehensive approach to assessing social sustainability inside an organization. This technique involves the active participation of multiple departments and management levels, allowing for a holistic evaluation of the firm's social sustainability (D'Eusanio et al., 2019).

Understanding stakeholders' viewpoints is crucial for conducting a thorough assessment of social impacts. Stakeholders, such as academic staff, administrative staff, and students, offer unique perspectives on the social dynamics and difficulties encountered by Kabul University. Integrating qualitative data, such as statements from stakeholders, can enhance the quantitative findings and provide a deeper understanding of social implications (Traverso et al., 2012).

Therefore, the social LCI data were collected from related faculties and departments at Kabul University using three different validated questionnaires for academic staff, administrative staff, and students. The demographic profiles of the participating individuals have been streamlined and presented in Table 4.5 for the characteristics of academic staff, Table 4.6 for the characteristics of administrative staff, and Table 4.7 for the characteristics of students. The demographic details of the academic staff include variables such as gender, age, educational attainment, academic rank, race, religious affiliation (madhab), marital status, monthly income, household size, organizational experience, and university designation. The gender of the respondents was ascertained by including a question in the questionnaire that inquired about their gender.

4.3.1 Demographic Profiles

4.3.1.1 Demographic Profiles of Academic Staff

In Table 4.5, the respondents were classified according to gender. The dominant gender among academic staff is male (78%), followed by female (22%) for all faculties and academic departments of Kabul University. Therefore, the predominant gender at Kabul University is male, while female representation is significantly lower. Afghanistan, as a country affected by war, offers limited opportunities for women to engage in higher education. The percentage of the respondents in the range of 20–30 years old is 12.3%, 49.8% (31–40 years old respondents), 22.0% (41–50 years old respondents), 13.7% (51–60 years old respondents), and 2.2% (respondents above 60 years old). The analysis of the age of the respondents shows that most of the academic staff are between the ages of 31–40 years old. Most of them were appointed by the new government establishment in 2002 based on faculty improvement and Kabul University's establishment of new faculties and departments.

Based on Table 4.5, the respondents were asked to report their level of education in four groups: Bachelor, Master, Doctoral, and Post-Doctoral. Based on the results, the dominant level of education among the respondents is the Master's level with 74.4%, followed by the Doctoral level (14.8%), the Bachelor's level (10.5%), and, and the Post-Doctoral level (0.0%). Considering the level of education in academic life, the academic ranking is significantly important. All academic staff are struggling to obtain the highest academic rank, which influences their salary and benefits. Based on Afghanistan's higher education law, academic promotion must be taken in 3–6 years intervals, and those who do not fulfill their requirement for academic promotion will be suspended. The majority of academic ranks are held by junior lecturers, comprising 31.8% of the total respondents. The remaining ranks include senior lecturers (20.6%), assistant professors (19.9%), associate professors (13.7%), nominated lecturers (10.8%), and professors (3.2%).

The Pashtun ethnic group makes up 65% of the academic staff, who dominates the majority of Afghanistan's population. The second dominant group at Kabul University is the Tajik ethnic group with 26.4%, followed by the Hazara ethnic group (4.3%), and the Uzbek ethnic group (1.1%). Other ethnic groups like Pashai, Pamir, Qazalbash, Arab, Turkman, and Sadat represent 3.2% of the academic staff at Kabul University. Afghanistan's population consists of diverse religious groups, including Muslim (Sunni and Shia), Hindu, and Sikh. The most dominant group at Kabul University is the Muslim (Sunni) group with 85.2%, followed by the Muslim (Shia) group (14.4%), while other groups represent 0.4% of the overall Kabul University's academic staff. For the marital status category, the majority of the respondents (80.1%) stated that they are married, 17.7% are single, and 2.2% are either divorced or separated.

For the income level of academic staff of Kabul University, 29.7% of the respondents reported a monthly income of up to AFs 24,000, 19.9% of the respondents with a monthly income of up to AFs 36,000, 19.2% of the respondents with a monthly income of up to 42,000 AFs, 17.3%% of the respondents with a monthly income of up to 27,000 AFs, 9.4% of the respondents with a monthly income of up to AFs 32,000, and 4.7% of the respondents with a monthly income of up to AFs 48,000.

Table 4.5 : Demographic characteristics of academic staff as the respondents

Demographic Variables	Item	Frequency (%)
Gender	Male	216 (78%)
	Female	61 (22%)
Age	20–30 years old	34 (12.3%)
	31–40 years old	138 (49.8%)
	41–50 years old	61(22.0%)
	51–60 years old	38 (13.7%)
	Above 60 years old	6 (2.2%)
Level of Education	Bachelor	29 (10.5%)
	Master	206 (74.4%)
	PhD	42 (15.2%)
	Post PhD	0 (0.0%)
Academic Rank	Nominated lecturer	30 (10.8%)
	Junior lecturer	88 (31.8%)
	Senior lecturer	57 (20.6%)
	Assistant professor	55 (19.9%)
	Associate professor	38 (13.7%)
	Professor	9 (3.2%)
Race	Pashtun	180 (65.0%)
	Tajik	73 (26.4%)
	Hazara	12 (4.3%)
	Uzbek	3 (1.1%)
	Others	9 (3.2%)
Madhab	Sunni	236 (85.2%)
	Shia	40 (14.4%)
	Others	1 (0.4%)
Marital Status	Single	49 (17.7%)
	Married	222 (80.1%)

Table 4.5 : Continued

	Others	4 (2.2%)
Monthly Income	Up to AFs 24,000	82 (29.7%)
	Up to AFs 27,000	48 (17.3%)
	Up to AFs 32,000	26 (9.4%)
	Up to AFs 36,000	55 (19.9%)
	Up to AFs 42,000	53 (19.1%)
	Up to AFs 48,000	13 (4.7%)
Number of Households	1 person	6 (2.2%)
	2–3 persons	18 (6.5%)
	4–5 persons	83 (30.0%)
	6–7 persons	73 (26.4%)
	8–9 persons	44 (15.9%)
	10 or more persons	53 (19.1%)
Experience in Organization	Less than 3 years	26 (9.4%)
	3–6 years	47 (17.0%)
	7–12 years	66 (23.8%)
	13–5 years	45 (16.2%)
	16–18 years	43 (15.5%)
	19–21 years	22 (7.9%)
	22–24 years or more	28 (10.1%)
Designation	Vice chancellor	2 (0.7%)
	Dean of faculty/institution	15 (5.4%)
	Deputy dean	9 (3.2%)
	Chairman/Head of department	45 (16.2%)
	Permanent lecturer	189 (68.2%)
	Contract lecturer	6 (2.2%)
	Others	11 (4.0%)

Based on Table 4.5 the number of households for 30.0% of the respondents at Kabul University is 4–5 persons, followed by 6–7 persons in the households (26.4% of the respondents), 10 persons or more (19.1% of the respondents), 8–9 persons (15.9% of the respondents), 2–3 persons (6.5% of the respondents), and 2.2% of the respondents live alone in their houses.

Based on the working experience of the academic staff at Kabul University, the most dominant group is 16–18 years of working experience (15.5% of the respondents), followed by 7–12 years of working experience (23.8% of the respondents), 3–6 years of working experience (17.0% of the respondents), 13–15 years of working experience

(16.2% of the respondents), 22–24 years or above of working experience (10.1% of the respondents), less than 3 years of working experience (9.4% of the respondents), and 19–21 years of working experience (2.2% of the respondents). Based on the higher education law of Afghanistan, all academic staff must be involved in the teaching, learning, and research activities alongside their designation in the university or outside the university. The most dominant group among the respondents who are involved in teaching activities as lecturers is permanent lecturers (68.2% of the respondents), followed by the chairman/head of departments (16.2% of the respondents), the deans of the faculty or directors of institutions (5.4% of the respondents), guest lecturers or advisors (4% of the respondents), deputy deans of the faculties (3.2% of the respondents), contract lecturers (2.2% of the respondents), and vice chancellors (0.7% of the respondents).

4.3.1.2 Demographic Profiles of Administrative Staff

In Table 4.6, the respondents were classified according to gender. The dominant gender among administrative is male (80.2%), followed by female (19.8%) for all faculties and departments of Kabul University. Therefore, the predominant gender at Kabul University is male, while female representation is significantly lower. The Afghan government prior to the Taliban provided significant opportunities for women, particularly in terms of policy support. Women were prioritized in the procurement process. The percentage of the respondents in the range of 31–40 years old is 38.5%, 35.8% (41–50 years old respondents), 17.6% (51–60 years old respondents), 5.3% (20–30 years old respondents), and 2.7% (respondents above 60 years old).

In addition, the respondents were asked to report their educational attainment in four categories: no formal education, 12^{th}-grade education, Bachelor's degree, and Master's degree. Based on the results, the predominant level of education is 12^{th} grade, accounting for 67.9%. Additionally, 25.1% of the respondents reported having no formal education, primarily employed as cleaners and office staff. Furthermore, 5.3% of the administrative staff hold Bachelor's degrees, while only 1.6% of the respondents possess Master's degrees.

Based on the contributions of various ethnic groups among the administrative staff at Kabul University, 39% of the staff belong to the Pashtun ethnic group, which dominates the majority of Afghanistan's population. The second largest group is the Tajik, comprising 27.3% of the administrative staff, followed by the Hazara, also at 27.3%. The Uzbek ethnic group accounts for 4.8% of the administrative staff, while other ethnic groups, including Pashai, Pamir, Qazalbash, Arab, Turkman, and Sadat, collectively make up 1.6% of the staff at Kabul University. Afghanistan's population is religiously diverse, with significant groups of Muslims (both Sunni and Shia), as well as Hindus and Sikhs. At Kabul University, the predominant religious affiliation is Muslim (Sunni), representing 69.0% of the administrative staff, followed by Muslim (Shia) at 30.5%. Other religious groups account for 0.5% of the overall administrative staff. Regarding marital status, a significant majority of the administrative staff, 80.2%, reported being married. In contrast, 13.9% identified as single, while 5.9% fell into those who are divorced or separated.

According to the income levels of administrative staff at Kabul University, 54.5% of the respondents reported a monthly income of up to AFN 10,000, while 33.7%

reported an income of up to AFN 20,000. Additionally, 4.8% of the respondents indicated a monthly income of up to AFN 30,000, and the same percentage (4.8%) reported earning up to AFN 5,000. Furthermore, 2.1% of the respondents received a monthly income of up to AFN 40,000. Regarding household size, 41.7% of the respondents reported having 4–5 persons in their families, while 32.6% have 6–7 persons. Additionally, 21.4% of the respondents reported having 8–9 persons, and 2.7% have 10 or more persons in their households. Only 1.1% of the respondents lived alone, and 0.5% reported having 2–3 persons in their families.

Table 4.6 : Demographic characteristics of administrative staff as the respondents

Demographic Variables	Item	Frequency (%)
Gender	Male	150 (80.2%)
	Female	37 (19.8%)
Age	20–30 years	10 (5.3%)
	31–40 years	72 (38.5%)
	41–50 years	67 (35.8%)
	51–60 years	33 (17.6%)
	Above 60 years	5 (2.7%)
Level of Education	No formal education	47 (25.1%)
	12th Grade	127 (67.9%)
	Bachelor	10 (5.3%)
	Master	3 (1.6%)
Race	Pashtun	73 (39.0%)
	Tajik	51 (27.3%)
	Hazara	51 (27.3%)
	Uzbek	9 (4.8%)
	Others	3 (1.6%)
Madhab	Sunni	129 (69.0%)
	Shia	57 (30.5%)
	Other	1 (0.5%)
Marital Status	Single	25 (13.9%)
	Married	150 (80.2%)
	Others	11 (5.9%)
Monthly Income	Up to AFs 5,000	9 (4.8%)
	Up to AFs 10,000	102 (54.5%)
	Up to AFs 20,000	33 (33.7%)
	Up to AFs 30,000	9 (4.8%)
	Up to AFs 40,000	4 (2.1%)
Number of households	1 person	2 (1.1%)
	2–3 persons	1 (0.5%)
	4–5 persons	78 (41.7%)
	6–7 persons	61 (32.6%)
	8–9 persons	40 (21.4%)
	10 or more persons	5 (2.7%)

Table 4.6 : Continued

Experience in Organization	Less than 3 years	2 (1.1%)
	3–6 years	32 (17.1%)
	7–12 years	59 (31.6%)
	13–15 years	45 (24.1%)
	16–18 years	25 (13.4%)
	19–21 years	18 (9.6%)
	22–24 years or above	6 (3.2%)
Designation	Director	10 (5.3%)
	Coordinator	6 (3.2%)
	Manager	84 (44.9%)
	Technician	20 (10.7%)
	Clerk	21 (11.2%)
	Cleaner	37 (19.8%)
	Office Servant	9 (4.8%)
Working Place	AVC Office	18 (9.6%)
	AFVC Office	30 (16.0%)
	SAVC Office	52 (27.8%)
	Faculty	23 (14.4%)
	Library	41 (21.9%)
	Hostel	5 (2.7%)
	Others	14 (7.5%)

Based on the Table 4.6 working experience of the administrative staff at Kabul University, the most dominant group is 7–12 years of working experience (31.6% of the respondents), followed by 13–15 years of working experience (24.1% of the respondents), 3–6 years of working experience (17.1% of the respondents), 16–18 years of working experience (13.4% of the respondents), 19–21 years or above of working experience (9.6% of the respondents), 22-24 years of working experience (3.2% of the respondents), and less than 3 years of working experience (1.1% of the respondents). Moreover, the dominant group among the respondents is comprised of managers, accounting for 44.9%. Additionally, 19.8% of the respondents are cleaners in various departments within the university, while 11.2% are clerks working in different offices. Technicians from the laboratories in various faculties made up 10.7% of the respondents, 5.3% are directors of institutions, 4.8% are office staff, and 3.2% served as coordinators of management centers under the Chancellor's Office and the Vice Chancellors' Offices at Kabul University.

The administrative staff at Kabul University is distributed across various offices. The largest group, comprising 27.8% of the respondents, works under the Office of the Vice Chancellor for Student Affairs. The second largest group, accounting for 21.9% of the respondents, is employed in the Kabul University Library. Additionally, 16% of the respondents work in departments related to the Office of the Vice Chancellor for Finance. Furthermore, 14.4% of the respondents are employed in various faculties, while 9.6% work under the Office of the Vice Chancellor for Academic Affairs. Meanwhile, 7.5% of the respondents are engaged in other departments associated with Kabul University but supported by external stakeholders. Finally, 2.7% of respondents work in the university hostels of Kabul University.

4.3.1.3 Demographic Profiles of Students

In Table 4.7, the respondents were classified according to gender. The dominant gender among students is male (82.5%), followed by female (17.5%) for all faculties and departments of Kabul University. Therefore, the predominant gender at Kabul University is male, while female representation is significantly lower. The percentage of the respondents in the range of 18–25 years old is 90.6%, 8.5% (26–35 years old respondents), 17.6% (51–60 years old respondents), and 0.9% (36–41 years old respondents).

In addition, the data regarding current program enrollment indicate that the respondents were asked to report their enrollment in three academic levels: Bachelor's, Master's, and Doctoral programs. The results show that 92.9% of the students were enrolled in Bachelor's programs across 103 departments at Kabul University, while

6.4% were enrolled in Master's programs, and 0.7% were enrolled in Doctoral programs among the respondents.

Furthermore, the distribution of students across their respective faculties is significant in relation to their chosen professions. The largest group of respondents, comprising 17.3%, belongs to the Faculty of Language and Literature. This is followed by 9.2% from the Faculty of Economics, 8.1% from the Faculty of Law and Political Science, and 8.0% from the Faculty of Agriculture. Additionally, 7.4% of the respondents are from the Faculty of Psychology, 6.0% from the Faculty of Engineering, 5.1% from the Faculty of Social Science, and 5.0% from the Faculty of Environment. The remaining percentages include 4.4% from the Faculty of Sharia, 3.9% from the Faculty of Geoscience, 3.7% from the Faculty of Physics, and 3.4% from both the Faculty of Mathematics and the Faculty of Journalism. Lastly, 2.7% of the respondents belong to the Faculty of Public policy and Administration y and the Faculty of Biology, 2.5% to the Faculty of Pharmacy, 1.4% to the Faculty of Veterinary Science, and 0.5% to the Faculty of Computer Science, respectively.

Table 4.7 : Demographic characteristics of students as the respondents

Demographic Variables	Item	Frequency (%)
Gender	Male	466 (82.5%)
	Female	99 (17.5%)
	Missing value	4 (0.7%)
Age	18–25 years	512 (90.6%)
	26–35 years	48 (8.5%)
	36–40 years	5 (0.9%)
Current Program	Bachelor	525 (92.9%)
	Master	36 (6.4%)
	PhD	4 (0.7%)
Faculty	Language and Literature	98 (17.3%)
	Economics	52 (9.2%)
	Law and Political Science	46 (8.1%)
	Public Administration	15 (2.7%)
	Psychology	42 (7.4%)

Table 4.7: Continued

	Journalism	19 (3.4%)
	Sharia	25 (4.4%)
	Social Science	29 (5.1%)
	Fine Art	16 (2.8%)
	Engineering	34 (6.0%)
	Agriculture	45 (8.0%)
	Mathematics	19 (3.4%)
	Physics	21 (3.7%)
	Chemistry	14 (2.5%)
Semester	Biology	15 (2.7%)
	Pharmacy	14 (2.5%)
	Computer Science	3 (0.5%)
	Veterinary Science	8 (1.4%)
	Environment	28 (5.0%)
	6th semester	44 (7.8%)
	7th semester	65 (11.5%)
	8th semester	120 (21.2%)
	9th semester	6 (1.1%)
	10th semester	4 (0.7%)
Race	Pashtun	218 (38.6%)
	Tajik	176 (31.2%)
	Hazara	137 (24.2%)
	Uzbek	12 (2.1%)
	Others	22 (3.9%)
Madhab	Sunni	394 (70.1%)
	Shia	163 (28.8%)
	Other	6 (1.1%)
Marital Status	Single	478 (84.8%)
	Married	71 (12.6%)
	Others	16(2.8%)

Considering the Table 4.7, the distribution of enrolled students based on their progress across different semesters reveals that 21.2% of the respondents are from the 8th semester, making it the largest group. The second largest group consists of 15.8% of the respondents from the 3rd semester. Both the 2nd and 7th semesters have equal representation, with 11.5% of the respondents each. Additionally, 10.4% of respondents belong to the 1st semester, while 8.7% are from the 5th semester. The students in the 6th semester account for 7.8% of the respondents, followed by 1.1% from the 9th semester, and finally, 0.7% of respondents are from the 10th semester across all faculties and departments of Kabul University. Overall, the distributions of the respondents for each demographic category are representative of the entire study population.

4.3.2 Inventory Results of All Related Indicators for Workers (Academic and Administrative Staff)

The inventory results for all related indicators of workers and consumers are presented in Table 4.8, Table 4.9, and Table 4.10. The relationship between the results of the inventory analysis and the stakeholder impact categories was analyzed in detail. Possible reasons for the chosen stakeholder impact categories are discussed accordingly.

Table 4.8 : Inventory results of workers (academic and administrative staff) of Kabul University

Stakeholder Categories	Sub-Category Indicator	Indicator	Academic Staff	Administrative Staff
Workers (Academic and Administrative Staff)	Job satisfaction	Presence of work satisfaction	68.36%	62.68%
	Fair salary	Satisfaction in wages paid by an organization	51.92%	58.3%
	Discrimination/ Equal opportunity	Presence of discrimination/presence of equal opportunity	56.14%	65.84%
	Health and safety	Presence of health and safety facilities	54.10%	64.98%
	Social benefits/Social security	Presence of social benefits/social security	54.77%	68.41%
	Employment relationship	Presence of relationship between the leadership and workers	62.38%	52.76%
	Sexual harassment	Presence of sexual harassment issues in an organization	40.43%	47.04%

The cultural background of Afghanistan has a substantial influence on the social impacts that can be noticed at Kabul University. Gender discrepancies among academic and administrative staff, such as unequal representation based on gender, are indicative of larger social issues with gender equality. This underscores the necessity of implementing focused measures to tackle cultural prejudices and foster inclusiveness (Babury & Hayward, 2013). To exemplify the gender-specific issues encountered in the university setting, the gender issues emphasize the need for focused measures to address gender inequalities in the Afghan higher education setting.

The research findings displayed in Table 4.8 offer useful insights into the perspectives of academic and administrative personnel at Kabul University concerning several facets of their work environment. These data seem to be a component of S-LCA research, which seeks to assess the social impact of an organization or system.

This study highlights the strengths and weaknesses of Kabul University. The institution should prioritize addressing the discrepancies in perspectives between academic and administrative staff, especially in regard to equitable remuneration, discrimination, and health and safety concerns. In addition, endeavors to augment social advantages and fortify leadership connections with administrative personnel could result in enhanced general job satisfaction.

4.3.2.1 Job Satisfaction

All of the employees were questioned regarding their degree of satisfaction with the tasks associated with their jobs, as well as the promotion and safeguarding of their interests, in order to ascertain the level of job satisfaction. The degree of promoted and protected interests exhibited by Kabul University demonstrated slight fluctuations. An average percentage of 68.36% of the respondents of Kabul University's academic staff shows that they are satisfied with their job as lecturers and involvement in teaching and learning activities. Meanwhile, an average percentage of 62.68% of the non-academic staff, which includes administrative staff, and all other workers are satisfied with their work at Kabul University.

The notable inconsistency in satisfaction ratings between academic and non-academic personnel, amounting to a difference of 5.68%, is worth mentioning. This discrepancy might be ascribed to a variety of causes, including variations in job duties, perceived status, independence, or prospects for career advancement. It is noteworthy that although the satisfaction scores are typically favorable, there is still potential for enhancement, especially among non-academic personnel (Bentley et al., 2012). Kabul University, like many other HEIs, encounters difficulties in ensuring consistent job satisfaction among all staff categories.

The emphasis of the study on evaluating job satisfaction through an examination of occupational responsibilities and the promotion and protection of employee interests showcases a thorough and all-encompassing approach. Having a comprehensive perspective is essential for comprehending the entirety of the employee experience and pinpointing potential opportunities for intervention or enhancement (Machado-Taylor et al., 2011).

Considering the difficult circumstances surrounding higher education in Afghanistan, these satisfaction numbers are promising. According to their suggestions, Kabul University has successfully established a comparatively favorable work environment, even though it may confront limitations in resources and other difficulties commonly encountered by institutions in underdeveloped nations.

4.3.2.2 Fair Salary

Providing equitable remuneration has the potential to cultivate a strong sense of commitment and dedication among the workforce. Individuals are more inclined to exhibit higher levels of organizational commitment and actively contribute to the achievement of long-term objectives when they see equitable treatment within the business. The salary is fair for the academic staff for the service that they provide to Kabul University, as agreed by 51.92% of the respondents. It means that more than 50% of the academic staff are satisfied with the wage and salary received from Kabul University. The minimum wage for the academic staff in Afghanistan is AFs 24,000, which was implemented in 2018. Moreover, based on the questionnaires, 58.3% of the academic staff are satisfied with the wages paid by the organization.

According to previous findings, work satisfaction among academic staff at institutions in Afghanistan, specifically Kabul University and Paktia University, seems to be generally favorable, and there is potential for improvement. A study conducted at Kabul University determined that professors exhibited job satisfaction levels that exceeded the average. Similarly, research conducted at Paktia University established a favorable correlation between elements affecting job happiness and employee performance. The determinants of job satisfaction encompassed working conditions, promotion prospects, supervision, compensation, and interpersonal interactions with colleagues. The studies highlight the significance of job happiness in improving employee performance and retention in academic environments. Nevertheless, there remain persisting obstacles, namely in domains such as fair compensation and working conditions. These findings indicate that Afghan institutions should prioritize enhancing many facets of job satisfaction to enhance staff performance and increase employee retention in the higher education sector (Sahibzada et al., 2022).

Furthermore, the provision of a fair salary holds significant importance for employees within an organization due to its various positive impacts. Firstly, it promotes job satisfaction among employees, serving as a source of motivation and aiding in the retention of talented individuals. Additionally, fair compensation cultivates a sense of equity and well-being among employees, thereby reducing turnover rates. Moreover, adhering to legal obligations regarding salary ensures compliance and upholds the organization's reputation. In addition, fair compensation has been found to enhance employee performance, support workplace diversity, and foster employee loyalty. Ultimately, these factors collectively contribute to the overall success and competitiveness of the organization within the job market.

The social ramifications of Kabul University are intricately intertwined with wider social concerns and development objectives in Afghanistan. As an illustration, the university's endeavors to enhance job satisfaction and fair salary are in line with the United Nations (UN) Sustainable Development Goals (SDGs), specifically SDG 8 (Decent Work and Economic Growth). Kabul University contributes to national development goals and strengthens its role as a catalyst for social change by addressing these social status repercussions (UNDP, 2015).

4.3.2.3 Discrimination/Equal Opportunities

The presence of discrimination and the provision of equal chances within a university as an organizational entity significantly affect its personnel capabilities of employees.

Discrimination within a workplace setting can engender an adverse and toxic atmosphere, hence resulting in diminished employee morale, decreased productivity, and heightened rates of employee attrition (Anjum et al., 2018). On the other hand, a robust dedication to ensuring equal opportunities cultivates a varied and all-encompassing environment wherein employees are esteemed for their aptitudes and proficiencies, leading to increased job satisfaction, heightened innovation, and an improved standing, ultimately drawing in exceptional individuals and bolstering university's achievements in both research and education. The respondents were asked if they perceived any discrimination based on gender, race, nationality, political affiliation, or social class at Kabul University.

The academic and administrative staff at Kabul University were asked if there were any gender, racial, nationality, political, language, social class, or training discrimination. From the findings, 56.14% of the academic staff and 65.84% of the administrative staff stated that they are not subjected to gender, racial, nationality, political, language, social class, or training discrimination at Kabul University. Among explanations for this difference include standardized procedures and clearer hierarchy that may reduce perceived discrimination in administrative roles, which are related to organizational structure (Terosky et al., 2014). Academic positions depend on subjective judgments like research quality and teaching efficacy, which may increase biased perceptions, depending on the nature of work (Bozeman & Gaughan, 2011).

Academics may be especially susceptible to prejudice due to the competitive nature of their jobs and the importance of reputation (Johnsrud & Rosser, 2002). Although encouraging, these results show areas for development. Over 40% of the academic staff and 30% of the administrative staff may have experienced discrimination, highlighting the need for equality and diversity.

Additionally, it is essential to take into account these discoveries within the framework of Afghanistan's wider societal difficulties. According to (Babury & Hayward, 2013), Afghan higher education has achieved notable progress in recent years. However, it still encounters challenges concerning gender equality and ethnic representation. In order to tackle these concerns, Kabul University should contemplate adopting more stringent anti-discrimination measures, offering comprehensive diversity and inclusion training, and developing transparent mechanisms for reporting and resolving discrimination grievances.

Although the SO-LCA approach offers useful insights, it is not without limits. In the Afghan context, cultural prejudice and data reliability pose substantial obstacles. For example, the negative perception linked to reporting instances of discrimination or harassment can result in a lower number of reports, which in turn impacts the reliability of the data. Moreover, the reliance on self-reported data can bring biases that require careful consideration (Martínez-blanco et al., 2015).

4.3.2.4 Health and Safety

This subcategory focuses on the investigation of a variety of topics, including the incidence of accidents and injuries at work, the provision of training, the level of knowledge regarding health and safety issues, the availability of protective equipment and its utilization, as well as the study of responsiveness and safety in the workplace.

The respondents were asked about the health and security situation at Kabul University and during their teaching and learning activities and laboratory work. From the findings, 54.10% of the academic staff stated that the health and safety situation is clear, and occupational health and safety features are installed in all classrooms and laboratories. Also, according to the overall security situation, sufficient measures have been taken at Kabul University to ensure its security. In contrast, 64.98% of the administrative staff agreed on the matter.

Overall, the results suggest that Kabul University has implemented certain measures to ensure health, safety, and security in the workplace. Additional improvements, especially in academic domains, could be advantageous. This is consistent with research on occupational health and safety at HEIs in poor countries, where there are often difficulties in fully adopting comprehensive safety measures (Toker, 2011).

In conclusion, an analysis of the social performance of Kabul University in relation to other universities offers significant contextual information. However, universities in poor countries frequently encounter comparable obstacles concerning health and safety, gender equality, and stakeholder participation. Kabul University can assess its performance by comparing it to similar institutions, allowing it to find effective strategies and areas that need improvement.

4.3.2.5 Social Benefits/Social Security

This subcategory focuses on whether or not the university provides its workers with social benefits and social protection. The workers receive benefits like free schooling, a kindergarten facility at Kabul University, job security, and health care. Moreover, the community gives honors to the academia, and is involved in decision-making in the society. Furthermore, Kabul University also provides housing facilities, and academic staff can receive this benefit. About 54.77% of the academic staff stated that they received social security and social benefits from the university and society. Meanwhile, 68.41% of the administrative staff at Kabul University are more satisfied than the academic staff by receiving social support when working at Kabul University. It is shown that a moderate number of employees show favorable attitudes toward the social security and social benefits that they receive. The discrepancy in the level of satisfaction suggests a possible opportunity for enhancing the university's benefits system, particularly for the academic faculty.

These findings are consistent with studies conducted on work satisfaction in HEIs in developing nations, where non-salary benefits are essential in determining overall employee happiness. Conducting additional research on the reasons that contribute to this disparity could assist Kabul University in strengthening its support systems and potentially enhancing job satisfaction among all staff categories (Rafat, 2024).

4.3.2.6 Employment Relationship

The significance of the employment relationship within a university setting is of paramount importance due to several factors, which underscore the intricate and diverse characteristics inherent in academic institutions. The significance of the job relationship within a university setting can be emphasized through these essential points: the process of generating and sharing knowledge, the process of teaching and learning, organization reputation, research productivity, students' engagement, institutional development, continuous improvement, community and industry engagement, diversity, and ethical standards. Furthermore, the advantages of a solid employment relationship in a university are numerous and critical to the institution's success. A healthy and collaborative work atmosphere among lecturers and staff contributes greatly to the university's overall performance and influence.

In essence, the advantages of a positive employment relationship go beyond the individual experiences of lecturers and staff, impacting the character and influence of the university on a local and worldwide scale. A healthy working relationship is critical to the university's ability to carry out its purpose of education, research, and community service.

The academic staff stated that there is a strong relationship between the top management and workers, where 62.38% of them stated the existence of the relationship. Meanwhile, 52.76% of the administrative staff stated that there is a relationship between top management and workers, but they are less satisfied with the employee relationship in the organization compared to the academic staff.

The SO-LCA of Kabul University shows that academic and administrative staff reported different work connections. Academic staff has a better relationship with senior management (62.38%) than administrative staff (52.76%). According to Gappa et al. (2007), university academics have more autonomy and collegiality. Academic work entails more direct involvement with leadership through research collaborations and departmental governance, which may explain academic staff's happiness (Bozeman & Gaughan, 2011). On the other hand, administrative staff's happiness is lower, suggesting organizational communication and inclusion difficulties, where

Terosky et al. (2014) identified these factors as key determinants in the satisfaction of higher education staff. These findings suggest that Kabul University should address potential discrepancies in employee involvement and communication strategies across staff categories to improve organizational cohesion and satisfaction.

4.3.2.7 Sexual Harassment

Sexual harassment in the workplace refers to unwanted and inappropriate sexual behavior that produces a hostile or frightening work environment. It can take many forms, and it is vital to understand that it is not restricted to explicit or physical actions; it can also encompass verbal, visual, or textual behavior, and quid pro quo harassment. The result shows that there is less sexual harassment at Kabul University, where 40.43% of the academic staff agreed about sexual harassment in the university, while 47.04% of the administrative staff believed that there is sexual harassment in the university.

Nevertheless, it is important to exercise caution when interpreting these results. The reported rates of sexual harassment among academic staff (40.43%) and administrative staff (47.04%) may not provide an accurate representation of the actual extent of the problem. In Afghanistan, cultural traditions frequently inhibit open discourse on difficult subjects, which might result in a lack of accurate reporting. According to a staff member, there is a negative perception associated with talking about harassment. Several individuals may choose not to report it due to the apprehension of potential repercussions or societal norms.

According to a study on workplace sexual harassment (Quick & McFadyen, 2017), it is essential to include these many forms in the assessment in order to fully grasp the magnitude of the problem. Organizational culture is the prevalence of reported instances of sexual harassment, which indicates possible problems with the organizational culture at Kabul University. According to Willness et al. (2007), organizational climate has a crucial role in the occurrence of sexual harassment. This suggests that Kabul University should consider addressing wider cultural and policy issues.

Based on the gender factor, although the findings do not provide a gender breakdown of harassment rates, it is crucial to acknowledge that sexual harassment frequently has a greater impact on women (Fitzgerald & Cortina, 2018). Consequently, the results of the SO-LCA study on sexual harassment at Kabul University are highly alarming and highlight an urgent requirement for institutional intervention. The institution must give top priority to establishing a secure and respected work environment for all staff members, including developing strong anti-harassment rules and promoting a culture that strictly condemns sexual harassment.

4.3.2.8 Comparison of the Social Performance of Academic and Administrative Staff

The SO-LCA of Kabul University highlights notable disparities in social performance between academic and administrative staff. The findings are explained accordingly as follows:

1. Job satisfaction: Job satisfaction is higher among academic staff (68.36%) than administrative staff (62.68%). This is consistent with research indicating that

academic positions frequently offer greater intrinsic motivation due to the nature of intellectual activity (Bozeman & Gaughan, 2011).

2. Salary equity: Administrative staff exhibits a higher degree of satisfaction with their wages (58.3%) in comparison to academic staff (51.92%). The variation in salaries can be ascribed to the intricate salary systems commonly seen in academia, where factors like research productivity and teaching responsibilities might affect remuneration (Altbach et al., 2013).

3. Discrimination/Equal opportunity: Administrative staff indicates a higher perception of equal opportunities (65.84%) compared to academic staff (56.14%). This difference may be attributed to the greater organization and formalization of administrative posts, whereas academic positions can be influenced by factors such as publication records and research funds, which could potentially result in perceived disparities (Terosky et al., 2014).

4. Health and safety: According to the data, administrative staff experienced higher levels of health and safety conditions (64.98%) compared to academic staff (54.10%). The discrepancy may arise from the diverse characteristics of academic tasks, such as laboratory and fieldwork, which can introduce supplementary safety complexities (Walters et al., 2020).

5. Social benefits/Social security: These indicators are reported to be much more satisfying for administrative staff (68.41%) compared to academic staff (54.77%). The difference could be attributed to variations in benefit arrangements or the level of knowledge of the advantages that are accessible to each group (Johnsrud & Rosser, 2002).

6. Employment relationship: It is noteworthy that academic staff shows a higher percentage (62.38%) of reporting positive employment relationship compared to administrative staff (52.76%). This difference may be attributed to the increased autonomy inherent in academic work and the prevalent collegial culture observed in academic departments (Gappa et al., 2007).

7. Sexual harassment: Both groups express the stratification level of sexual harassment; with administrative staff demonstrate a significantly higher

unsatisfied (47.04%) than academic staff (40.43%). The data presented in these figures emphasize a noteworthy problem that necessitates immediate action from university administrators (Henning et al., 2017).

In general, both groups have a moderate level of social performance. However, the administrative staff tends to express greater happiness in most areas, with the exception of job satisfaction and employment relationship. These findings indicate that Kabul University should focus on addressing particular issues within its academic staff, which are related to equitable compensation, equal access to opportunities, and ensuring health and safety measures. The institution should also establish comprehensive rules to effectively combat sexual harassment among all staff categories.

The findings of this study offer significant perspectives for enhancing social sustainability at Kabul University. The findings also highlight the importance of implementing focused interventions that cater to the distinct requirements and difficulties faced by various staff groups.

4.3.3 Inventory Results of Related Indicators for Consumers (Students)

This section analyzes the social impacts of Kabul University, focusing on the viewpoint of students as consumers. The SO-LCA approach offers a thorough assessment of social impacts. However, it is essential to further examine the interpretation of these impacts by taking into account students' views, cultural context, and the incorporation of both quantitative and qualitative data.

The inventory results for the students of Kabul University indicate diverse levels of satisfaction across several facets of their educational experience. The health and safety aspect is particularly worrying, as only 30.77% of the students indicated that sufficient precautions are in place to prevent diseases, injuries, and accidents. The low score indicates a pressing requirement for enhancement in campus safety practices. Regarding the institution's feedback methods, the students show a moderate degree of satisfaction (57.96%), suggesting that the university is fairly receptive to student issues. The results for privacy (61.67%) and transparency (61.98%) indicate that students typically perceive their personal information to be adequately safeguarded and that university processes are suitably accessible. The area of end-of-life responsibility, which presumably pertains to career assistance and services for graduates, achieved a score of 60.25%, showing a moderate level of satisfaction with support after graduation.

Table 4.9 : Inventory results of consumers (students) at Kabul University

Stakeholder Categories	**Sub-Category**	**Indicator**
Health and safety	Presence of safety and prevention of any disease, injury, and/or accident	30.77%
Feedback mechanism	Presence of students' satisfaction level with the services provided by the university with a robust feedback mechanism	57.96%
Privacy	The presence of privacy in the organization	61.67%
Transparency	The presence of transparency in the university among students	61.98%
End-of-life responsibility	The presence of end-of-life responsibility in higher education organizations upon graduation from the program	60.25%

The cultural setting of Afghanistan exerts an important impact on the social implications witnessed among students at Kabul University. Gender differences among students exemplify wider social obstacles pertaining to gender equality. In the context of Afghanistan's social and religious circumstances, a female student expressed that she frequently encounters difficulties that her male peers do not, which has a negative impact on her academic achievements and contribution. This underscores the necessity of implementing focused measures to tackle cultural prejudices and foster gender inclusiveness (Babury & Hayward, 2013).

The results of this study are consistent with previous research conducted on students' satisfaction with HEIs in developing countries. It has been observed that in such nations, issues related to health and safety tend to receive less attention compared to other aspects of students' experience.

The cultural context of Afghanistan significantly influences the interpretation of these results. For example, moderate satisfaction with privacy (61.67%) and transparency (61.98%) should be considered because of the country's recent history of political instability and limited academic freedoms. The findings emphasize specific areas in which Kabul University may concentrate its endeavors to improve students' happiness and overall educational excellence.

4.3.3.1 Health and Safety

The health and safety of university students is an issue of the utmost importance, encompassing a wide range of campus activities. An important concern relates to the physical safety of students, which necessitates the implementation of secure environments, fire safety protocols, and well-maintained infrastructure to avert accidents and injuries. Furthermore, the significance of mental health has become apparent in relation to the overall welfare of students, necessitating universities to provide sufficient means to offer counseling and support services. An additional element relates to the advocacy for a health-conscious way of life, encompassing provisions of nourishing meals, recreational amenities, and endeavors that foster physical exertion. In addition, it is imperative that universities deal with concerns pertaining to public health and infectious diseases, specifically in communal living environments such as dormitories.

Promoting awareness regarding safe practices, establishing contingency plans in the event of an emergency, and ensuring adherence to health and safety regulations are fundamental elements in cultivating a safe and supportive atmosphere that facilitates the academic and personal growth of students. Universities fulfill an essential function by not only imparting knowledge but also fostering the comprehensive welfare of their student body. The respondents recorded 30.77% satisfaction on the health and safety issues. There are facilities at Kabul University that aim to prevent incidents and prioritize student health. However, the students reported a low level of satisfaction with the facilities provided, where only 30.77% of the respondents expressed satisfaction with the health and safety conditions.

The social impacts on students are extremely connected to wider social matters and development objectives in Afghanistan. For instance, the university's endeavors to enhance health and safety are in line with the UN SDGs, including SDG 3 (Good Health and Well-Being). Kabul University contributes to national development goals and strengthens its role as a catalyst for social change by solving these social repercussions (UNDP, 2015).

4.3.3.2 Feedback Mechanism

A university feedback mechanism improves students' learning. This approach is needed because education is dynamic and requires constant improvement for students and teachers. Students benefit from constructive feedback on their academic achievement, strengths, and weaknesses. This information helps students choose learning tactics, create objectives, and get help when needed. Feedback also encourages students and faculty to communicate and collaborate, creating a positive learning atmosphere. Regular feedback allows educators to adapt their teaching approaches to students' different requirements, keeping the curriculum relevant and engaging. This cycle improves education for students and the system as a whole (Kostic et al., 2015). 57.96% of the respondents are satisfied with the existing feedback mechanism in their faculties at Kabul University.

A feedback mechanism encourages students' self-reflection and self-regulation, making it crucial. It fosters responsibility and ownership of learning. Feedback motivates kids to take risks, learn from their failures, and thrive academically. A well-established feedback mechanism helps students develop holistically and prepares them for professional difficulties. In conclusion, a strong feedback mechanism is essential for university students' development and academic success. It creates a dynamic feedback loop that increases individual growth and improves the educational ecosystem. As educational processes grow, a feedback mechanism is essential for promoting continual learning and improvement (Kostic et al., 2015).

In order to improve the feedback mechanism, Kabul University might establish a more organized and frequent procedure for gathering students' comments. Possible methods for gathering information could involve conducting anonymous online surveys, organizing focus groups, and ensuring student representation in decision-making bodies. By adopting participation and decision-making practices, the institution can effectively express the ways in which students' feedback has directly influenced and resulted in particular modifications. This method has the potential to enhance students' engagement and satisfaction with the feedback mechanism (Shah et al., 2017).

4.3.3.3 Privacy

Privacy is a key consideration within the university setting, specifically with regard to students' data, as it serves as a pivotal factor in upholding trust, autonomy, and ethical principles within the academic community. The preservation of students' privacy is of utmost importance due to a variety of factors. First, this policy prioritizes the preservation of individuals' autonomy in relation to their personal information, which includes academic records and other forms of sensitive data. The implementation of this safeguard is not only morally justifiable but also legally required, underscoring the imperative for colleges to adhere to data protection protocols (Tene & Polonetsky, 2012).

Furthermore, with the increasing integration of digital technologies in the field of education, it is imperative to prioritize the resolution of privacy problems in order to safeguard against unauthorized access, data breaches, and various other cyber risks. The implementation of rigorous privacy safeguards plays a significant role in enhancing the overall welfare of students, fostering a secure and nurturing educational setting (Farrow, 2017). 61.67% of the students from all faculties stated that the privacy rule is being followed at Kabul University.

In order improve privacy safeguards, Kabul University should consider the creation and execution of a thorough data protection strategy that conforms to global benchmarks. The policy should provide a clear and comprehensive description of the procedures for collecting, storing, utilizing, and safeguarding students' data. Implementing regular privacy audits and providing comprehensive staff training on data security could significantly bolster students' confidence in the university's privacy protocols (Tene & Polonetsky, 2013).

4.3.3.4 Transparency

Transparency plays a pivotal role in establishing trust and fostering a conducive learning atmosphere for students within an academic institution. The necessity for transparency is derived from the fundamental ideals of openness, accountability, and justice. It is imperative that students are afforded the fundamental entitlement to obtain unambiguous and all-encompassing information pertaining to many facets of their educational journey, encompassing entrance procedures, criteria for evaluation, and institutional regulations. According to the scholarly work of Bowen and Tobin (2015), the establishment of openness in the operations of universities is crucial in upholding credibility and providing students with comprehensive knowledge regarding the decision-making procedures that influence their educational endeavors. The establishment of transparent communication within an academic community, involving students, professors, and administration, plays a crucial role in cultivating a culture of trust and collaboration. This, in turn, contributes to a heightened sense of belonging and engagement among individuals within the academic community (Uzochukwu & Thomas, 2018). However, 98% of the respondents are satisfied about the transparency at Kabul University.

In order to enhance the transparency, Kabul University might implement an open data policy, which would involve making non-sensitive institutional data accessible to the public. This may encompass the dissemination of comprehensive financial statements, academic achievement indicators, and protocols for making decisions. Developing an intuitive web platform that allows students to easily access comprehensive information about their academic progress, such as grading standards and procedures for appealing grades, will greatly improve transparency (Bowen & Tobin, 2015).

4.3.3.5 End-of-Life Responsibility

The "end-of-life" concept refers to the final stage of an individual's existence, typically characterized by the cessation of vital bodily functions and the eventual death of the person (Austin, 2002). This phase is the notion of responsibility among students within a university setting, which is an integral aspect of the social organizational life cycle. This entails providing guidance to students outside their academic pursuits, equipping them with the necessary skills and knowledge to navigate the next stages of their lives. Universities play a significant role in fostering the comprehensive growth and enduring achievements of their graduates by providing career assistance, promoting alumni involvement, and offering continuous support (Hathaway et al., 2002). Only 60.25% of the respondents are satisfied with the transparency at Kabul University.

Within the framework of the SO-LCA, the notion of end-of-life responsibility within a university context pertains to the obligation of the institution to provide assistance and guidance to students as they navigate the transition from the academic setting to the subsequent stage of their personal and professional lives. The necessity for a comprehensive end-of-life responsibility mechanism is based on the concepts of comprehensive students' development, wherein institutions assume a pivotal role in equipping students for the potential difficulties they might encounter after completing their studies. This job includes providing career advice, engaging with alumni, and offering continuous support to facilitate a smooth transition into the workforce or higher education. Past research highlights the significance of comprehensive career services and post-graduation support in improving students' employability and fostering their long-term success (Gardner & Barnes, 2007).

Additionally, end-of-life responsibility refers to the university's responsibility in assisting students during their transition from academic life to their professional employment. This encompasses services like career guidance, assistance with finding employment, and networks for former students. A student stated that "the career services at Kabul University have played an important role in assisting in obtaining internships and job prospects." Providing strong support for students after they finish their studies can greatly improve their happiness and long-term achievements (Hathaway et al., 2002).

4.3.4 Social Issues and Social Performance of Kabul University Stockholders

Table 4.10 : Social performance and weighted results of the academic staff at Kabul University

Subcategory	Result	Weighting Factor	Weighted Result
Job Satisfaction	68.36%	0.18	12.04%
Fair Salary	51.92%	0.13	6.95%
Discrimination/Equal Opportunity	56.14%	0.14	8.12%
Health and Safety	54.10%	0.14	7.54%
Social Benefits/Social Security	54.77%	0.14	7.73%
Employment Relationship	62.38%	0.16	10.03%
Sexual Harassment	40.43%	0.10	4.21%
Total		**1.0**	56.63%

Table 4.10 presents the characterized social performance results for the academic staff in Kabul University. The results indicate moderate social performance (57%) of the academic staff in Kabul University. The subcategories of job satisfaction and employment relationship indicate good social performance. Meanwhile, the subcategories of discrimination/equal opportunity, social benefits/social security, health and safety, and fair salary indicate moderate social performance.

Although these quantitative statistics provide valuable information, they do not completely convey the complicated and varied perspectives of stakeholders. The workers mentioned that the lack of resources and constant security concerns have a substantial impact on their work. Qualitative insights are essential for understanding and interpreting numerical data in its proper context.

Sexual harassment was identified as one of the negative social issues in Kabul University among academic staff with a score of 40.43%, including unwanted sexual attention. This signifies the low rate of incidents observed and the academic staff is in good situation. About 40% of the academic staff were worried about such harassments.

Table 4.11 : Social performance and weighted results of the administrative staff at Kabul University

Subcategory	Result	Weighting Factor	Weighted Result
Job Satisfaction	62.68%	0.15	9.35%
Fair Salary	58.30%	0.14	8.09%
Discrimination/Equal Opportunity	65.84%	0.16	10.32%
Health and Safety	64.98%	0.15	10.05%
Social Benefits/Social Security	68.41%	0,16	11.14%
Employment Relationship	52.76%	0,13	6.63%
Sexual Harassment	47.04%	0,11	5.27%
Total		**1,0**	61%

Table 4.11 shows the characterized social performance results for the administrative staff in Kabul University. The results indicate good social performance (61%) of the administrative staff in Kabul University. The subcategories of social benefits/social security, discrimination/equal opportunity, health and safety, and job satisfaction indicate good social performance. Meanwhile, the subcategories of fair salary and employment relationship indicate moderate social performance. Sexual harassment was identified as one of the negative social issues in Kabul University among administrative staff with a score of 47.04%, including unwanted sexual attention. This signifies the low rate of incidents observed and the administrative staff is in good situation. Nearly 47% of the administrative staff were worried about such harassments.

Table 4.12 : Social performance and weighted results of the students at Kabul University

Subcategory	Result	Weighting Factor	Weighted Result
Health and Safety	30.77%	0.11	3.47%
Feedback Mechanism	57.96%	0.21	12.31%
Privacy	61.67%	0.23	13.93%
Transparency	61.98%	0.23	14.07%
End-of-Life Responsibility	60.25%	0.22	13.30%
Total		**1.0**	57.07%

Table 4.12 presents the characterized social performance results for the students in Kabul University. The results indicate moderate social performance (57%) of the students in Kabul University. The subcategories of transparency, health and safety, and privacy indicate good social performance. Meanwhile, the subcategories of end-of-life responsibility and feedback mechanism indicate moderate social performance. On the other hand, the health and safety subcategory indicate poor social performance in Kabul University, as the students were not satisfied about the facilities provided for health and safety during teaching and learning activities.

The findings of this study give comprehensive insights into both positive and negative social performance in Kabul University. The weighted overall social performance for each stakeholder in Kabul University is visualized in Table 4.13. As can be seen, there is moderate social performance in Kabul University. The administrative staff shows good social performance, whereas academic staff and students show moderate social performance.

Table 4.13 : Weighted overall social performance for each stakeholder in Kabul University

Stakeholders Involved	Weighted Result
Academic Staff	57%
Administrative Staff	61%
Students	57%

Based on Table 4.13, the SO-LCA at Kabul University, Afghanistan indicates a moderate level of social performance among all stakeholder groups with certain differences. The study examined three primary stakeholder groups: faculty members, administrative personnel, and students. The data indicated in Table 4.13 that administrative workers have the highest social performance score of 61%, suggesting that this group experienced significantly better social conditions. These findings can be ascribed to the increased level of job satisfaction (62.68%), the provision of enhanced social benefits and security (68.41% satisfaction rate), and the implementation of improved health and safety measures (64.98% agreement rate) (D'Eusanio et al., 2019).

Both the academic staff and students achieved a score of 57%, indicating that these groups faced similar social issues. The academic staff reported a moderate level of job satisfaction (68.36%), although this was counterbalanced by concerns regarding fair salary (51.92%) and problems related to discrimination and equal opportunity (56.14%). A mere 30.77% of students reported being satisfied with the health and safety circumstances, indicating that they experienced substantial difficulties in this aspect.

The report emphasizes various areas that need enhancement, namely in tackling gender disparities among all stakeholder groups. The demographic data indicate a substantial male predominance (78–82.5%) across all categories, which mirrors the wider societal obstacles in Afghanistan concerning women's involvement in higher education and work (Gardner & Barnes, 2007).

Additional areas requiring improvement encompass the improvement of health and safety protocols, particularly for students; the enhancement of working conditions for academic personnel; and the resolution of concerns pertaining to sexual harassment, which has been identified as a detrimental social problem among both academic (40.43%) and administrative staff (47.04%).

The study utilizes the SO-LCA approach to offer a thorough understanding of both favorable and unfavorable social outcomes at Kabul University. Woodhall (2004) suggested that it provides a basis for specific enhancements in the university's social sustainability policies, specifically in the domains of gender equality, health and safety, and working conditions.

This study showcases the significance of SO-LCA in assessing and enhancing social sustainability in HEIs, particularly in developing nations that encounter distinctive obstacles such as Afghanistan.

In conclusion, the results of the SO-LCA indicate that Kabul University experiences both positive and negative social impacts. This approach promotes the comprehension of social sustainability by including stakeholders' viewpoints, considering cultural context, and integrating both quantitative and qualitative data. In order to enhance the university's social sustainability initiatives and make a meaningful contribution to wider societal development objectives, it is important to acknowledge the limitations of the SO-LCA strategy and evaluate its effectiveness in comparison to other institutions.

4.4 Sustainability Scoring

As stated in Chapter 3, the sustainability scoring approach combines the findings from O-LCA, LCC, and SO-LCA to offer a thorough assessment of Kabul University's sustainability performance. This section offers a comprehensive description of how several assessments are combined to obtain the overall sustainability score. It also addresses potential methodological issues and constraints, as well as examines the trade-offs between different characteristics of sustainability.

An increase in the percentage of the environmental indicators means that there is a negative impact of these indicators on the total environmental impact. Therefore, referring to the Table 3.18 the scale of the environmental scores was defined as 4 points for 0–20%, 3 points for 21–40%, 2 points for 41–60%, 1 point for 61–80%, and

0 points for 81–100%. Omran et al. (2021) explained that an increase in the percentage of environmental indicators indicates a detrimental effect on the overall environmental impact. The environmental scores were assigned on a scale of 0–100% as follows: 4 points for 0–20%, 3 points for 21–40%, 2 points for 41–60%, 1 point for 61–80%, and 0 points for 81–100%. In order to obtain the overall score for the environmental impact, the scores of the subcategories within the same degree of impact category were averaged. Subsequently, the ratings for the impact categories were computed, and the resulting average score was attributed to the overall environmental impact.

Table 4.14 presents the environmental scores of the environmental impact categories and outlines a sustainability rating system based on many categories and subcategories of environmental impacts. The scoring methodology evaluates the O-LCA impacts on the organization in three primary impact categories: human health, ecosystem, and resources. A comprehensive examination of the table is presented as follows:

1. Human health: Most of the subcategories in this section received 4 points, indicating a minimal influence. Nevertheless, one of the concerning specific areas is global warming and impact on human health. The score is 3, which corresponds to 33.37%. Another concerning area is the generation of fine particulate matter with a score of 1, which corresponds to 63.26%.

2. Ecosystem: Most of the subcategories in this section received 4 points, signifying a moderate impact on various parts of the environment. Two specific areas that demonstrate a greater influence in this category are terrestrial acidification, which refers to the process of increasing acidity in land ecosystems, with a score of 3 and corresponds to 23.40%, as well as the impact of global warming on terrestrial ecosystems (62.54%).

3. Resources: This category exhibits a clear difference between its two subcategories. Mineral source scarcity recorded a score of 4 with 1.30%, while fossil resource scarcity recorded a score of 0 with 98.70%. The organization

demonstrates commendable efficiency in utilizing mineral resources, but it significantly contributes to the consumption of fossil resources.

The process of integrating O-LCA, LCC, and SO-LCA impacts into a unified sustainability score requires many methodological procedures. Initially, the scores for each dimension (environmental, economic, and social) are computed individually using the corresponding methodology. Subsequently, these scores are standardized to a uniform scale to guarantee comparability. Multi-criteria decision analysis is employed to merge these standardized scores, enabling the investigation of various weighting scenarios and the evaluation of trade-offs between sustainability parameters (Cinelli et al., 2014).

Table 4.14 : The total scores of the environmental impact categories of Kabul University

Impact Category	Subcategory	O-LCA Result (%)	Percentage Range	Score
Human Health	Stratospheric ozone depletion	0.00604493	0–20	4
	Ionizing radiation	0.01839047	0–20	4
	Ozone formation, human health	0.05604039	0–20	4
	Water consumption, human health	0.57545437	0–20	4
	Human carcinogenic toxicity	1.05088364	0–20	4
	Human non-carcinogenic toxicity	1.66010556	0–20	4
	Global warming, human health	33.3694839	21–40	3
	Fine particulate matter formation	63.2635968	61–80	1
Total Human Health Score				3.5
Ecosystem	Water consumption, aquatic ecosystems	0.00011135	0–20	4
	Marine eutrophication	0.00019451	0–20	4
	Global warming, freshwater ecosystems	0.00170865	0–20	4
	Marine ecotoxicity	0.00411853	0–20	4
	Freshwater ecotoxicity	0.00697337	0–20	4
	Terrestrial ecotoxicity	0.37847575	0–20	4
	Land use	2.07548095	0–20	4
	Water consumption, terrestrial ecosystems	3.72783002	0–20	4
	Freshwater eutrophication	2.89758924	0–20	4
	Ozone formation, terrestrial ecosystems	4.9687861	0–20	4

Table 4.14 : Continued

	Terrestrial acidification	23.3955473	21–40	3
	Global warming, terrestrial ecosystems	62.5431842	61–80	1
Total Ecosystem Score				3.75
Resources	Mineral resource scarcity	1.30189006	0–20	4
	Fossil resource scarcity	98.6981099	81–100	0
Total Resources Score				2
Total Environmental Score			3.06	

The environmental impact scores are computed by taking into account the percentage ranges of different subcategories, as tabulated in Table 4.14. The scores are subsequently averaged to derive the overall environmental score. This method enables the consolidation of indicators into a single value, providing a comprehensive evaluation of environmental performance.

The scores of the cost impact categories are presented in Table 4.15. In order to be more subjective between cost indicators, the total cost was obtained instead of all indicators being scored separately. The percentages of cost categories were obtained by dividing the value of each cost impact category by the total cost and multiplying the result by 100. Scores from 0 to 4 were assigned to each cost impact category according to the percentage of contribution given. An increase in the percentage of economic indicators means that there is a negative impact of these indicators on the total economic impact. As shown in Table 4.15, the lowest rating was obtained by the initial investment cost impact category. The initial investment, or initial/property costs, received a score of 3. This score is higher than that of other subcategories. The operation costs received a score of 1. Additionally, the maintenance costs, energy costs, and water costs received a low score of zero.

The most positive impact is shown by the initial investment or initial/property costs, with a score of 3. The total economic score for the economic dimension of Kabul University is 0.8.

Table 4.15 : The total scores of the economic impact categories of Kabul University

Impact Category	LCC Result (%)	Percentage Range	Score
Initial/Property Costs	78.69	61–80	3
Maintenance Costs	0.29	0–20	0
Energy Costs	0.34	0–20	0
Water Costs	0.38	0–20	0
Operation Costs	20.14	21–40	1
Total Economic Score			0.8

The economic impact scores, presented in Table 4.15, were calculated by dividing the value of each cost impact category by the total cost and multiplying the result by 100. Scores from 0 to 4 were assigned to each cost impact category according to the percentage of contribution. This methodology ensures that the economic dimension is adequately represented in the overall sustainability score.

For the social dimension, the results of the accumulated inventory for 13 subcategories under the proposed scoring system and the total scores obtained for the subcategories are presented in Table 4.16. As shown in the table, the social impact subcategories for job satisfaction, fair salary, discrimination/equal opportunity health, health and safety, social benefits/social security, employment relationship, and sexual harassment are relevant categories for academic and administrative staff, whereas subcategories relevant for students are health and safety, feedback mechanism, privacy, transparency, and end-of-life responsibility. The academic staff indicators for job satisfaction and employment relationships at Kabul University received a score of 3.0, followed by fair salary, discrimination/equal opportunity, health and safety, and social benefits/social security indicators, each scoring 2.0. The score for the sexual harassment indicator for academic staff was the lowest, at just 1.0.

For the administrative staff, the indicators of job satisfaction, discrimination/equal opportunity, health and safety, and social benefits/social security received the highest score of 3.0. In contrast, the indicators of fair salary, employment relationship, and sexual harassment received a score of 2.0. The overall score for both the academic and administrative staff categories is 2.6.

Moreover, the presence of discrimination, equal opportunity, and social security indicators has positive impacts with a score of 2. Although most indicators rated by academic and administrative staff reflected a high level of satisfaction, the indicators related to the availability of social benefits have the lowest level of satisfaction. Thus, Kabul University needs to improve these indicators to achieve the sustainability of HEIs.

Furthermore, as presented in the table, the social impact subcategories for privacy and transparency received the highest score of 3.0 in the consumer category. In contrast, the feedback mechanism and end-of-life responsibility subcategories scored 2.0, while the health and safety subcategory received a score of 1.0. The overall score for the consumer category is 2.2. Additionally, the cumulative score for all stakeholders, including workers and consumers, is 2.3.

Table 4.16 : The total scores of the social impact categories of Kabul University

Stakeholder Categories	Impact Category	SO-LCA Result (%)	Percentage Range	Score
Workers (Academic Staff)	Job satisfaction	68.36%	61–80	3
	Fair salary	51.92%	41–60	2
	Discrimination/Equal opportunity	56.14%	41–60	2
	Health and safety	54.10%	41–60	2
	Social benefits/Social security	54.77%	41–60	2
	Employment relationship	62.38%	61–80	3
	Sexual harassment	40.43%	21–40	1
	Total Social Score for Academic Staff			**2,1**
Workers (Administrative Staff)	Job satisfaction	62.68%	61–80	3
	Fair salary	58.3%	41–60	2
	Discrimination/Equal opportunity	65.84%	61–80	3
	Health and safety	64.98%	61–80	3
	Social benefits/Social security	68.41%	61–80	3
	Employment relationship	52.76%	41–60	2
	Sexual harassment	47.04%	41–60	2
	Total Social Score for Administrative Staff			**2,6**
Consumers (Students)	Health and safety	30.77%	21–40	1
	Feedback mechanism	57.96%	41–60	2
	Privacy	61.67%	61–80	3
	Transparency	61.98%	61–80	3
	End-of-life responsibility	60.25%	41–60	2
	Total Social Score for Students			2.2
Total Social Score				**2.3**

The social impact scores, shown in Table 4.16, are based on the findings of the SO-LCA for different stakeholder categories. These scores are weighted according to the importance of each subcategory and then integrated to obtain the total social score. This approach enables a comprehensive understanding of the social performance of Kabul University.

In conclusion, the sustainability score approach offers a thorough incorporation of the O-LCA, LCC, and SO-LCA findings. By including these several assessments, the technique provides a comprehensive assessment of Kabul University's sustainability performance. Nevertheless, it is crucial to recognize the methodological obstacles and constraints, which encompass the inherent subjectivity in the scoring procedure.

4.4.1 Limitations and Sensitivity Analysis of the Scoring System

Although the scoring system provides a standardized approach to assess sustainability, its limitations are recognized, such as the possibility of bias in assigning importance to various factors. The subjective nature of sustainability scoring systems can make it difficult to interpret and compare results in different contexts.

In order to address this issue, sensitivity analyses were performed by altering the weights assigned to various elements of sustainability. Experiments were conducted on three different scenarios: (1) each dimension is assigned an equal weighting of 33.33%; (2) the environmental aspect is given the most priority, accounting for 50% of the overall emphasis, while the economic and social aspects each contribute 25% to the overall emphasis; and 3) the economic aspect is given the most priority, accounting for 50% of the overall emphasis, whereas the environmental and social aspects each receive a 25% emphasis. The findings indicated that (1) when given equal importance, the overall sustainability score is 2.05, (2) the score increased to 2.37 with a focus on the environmental factors, and (3) the score decreased to 1.55 with a focus on the economic factors. Therefore, these findings emphasize the substantial influence that weighting choices can exert on the ultimate sustainability assessment. The range of scores highlights the significance of transparency in determining the weights for different aspects, as well as the need of engaging stakeholders in this decision-making process (Sala et al., 2015).

The development of the scoring criteria underwent a multi-step process:

1. An examination of current sustainability evaluation frameworks in higher education.

2. Consultations with experts in the field of sustainability, including professionals and academics.
3. Conducting pilot testing and making improvements based on feedback received from stakeholders at Kabul University.

Although efforts have been, it can be acknowledged that the scoring system may not comprehensively reflect the intricacies of sustainability in a post-conflict, resource-limited environment such as Afghanistan. Possible future improvements may involve integrating additional indicators that are specifically relevant to higher education in Afghanistan; creating a collaborative method for determining weight, which includes a broader group of individuals involved; and the use of alternative aggregation methods, such as outranking or fuzzy logic approaches, to effectively address the uncertainties present in sustainability assessment, as proposed by Cinelli et al. (2014).

4.5 Visualization of the OLCSA Results

A sustainability triangle is a visual graphic representation illustrating the three dimensions of an entity: social, environmental, and economic. The provided values for environmental, social, and economic dimensions are 3.06, 2.3, and 0.8, respectively. The lengths of the sides of the triangle correspond to the values assigned to each dimension. From the sustainability triangle in Figure 4.3, the environmental, social, and economic dimensions have values of 3.06, 2.3, and 0.8, respectively. The triangle offers a graphical representation of the comparative strengths or merits of each factor within the framework of sustainability.

4.5.1 Interpreting the Sustainability Triangle of Kabul University

A sustainability triangle visually depicts an organization's performance in the areas of environmental, economic, and social dimensions. The shape and size of the triangle provide crucial information about the equilibrium and overall viability of the organization.

From Figure 4.3, the triangle exhibits the environmental dimension with a score of 3.06, suggesting the implementation of robust environmental practices. This implies that the university has successfully implemented efficient resource management and waste reduction strategies, potentially as a result of strict environmental regulations or a strong institutional dedication to environmental stewardship.

The social dimension shows moderate performance, with a score of 2.3. This indicates that there has been some progress in areas such as community engagement and social equity, but there is still room for improvement. This may indicate difficulties in implementing extensive social sustainability initiatives in a post-conflict context.

The low score in the economic dimension (0.8) indicates significant financial challenges. This might be due to limited funding sources, inefficient resource allocation, or broader economic challenges in the Afghan higher education sector.

The imbalanced distribution of the triangle, with a significant emphasis on the environmental aspect, suggests that although Kabul University has made praiseworthy advancements in environmental sustainability, it should prioritize enhancing its economic sustainability without undermining its environmental accomplishments.

The moderate social performance suggests a requirement for improved approaches to address social issues, community engagement, and stakeholders' satisfaction.

This visualization facilitates the identification of key areas that require improvement, specifically in terms of economic sustainability. Furthermore, it emphasizes the need for a more equitable strategy to guarantee the long-term sustainability in all three aspects of sustainability.

The sustainability triangle analysis of Kabul University reveals an imbalance among the three pillars of sustainability (social, environmental, and economic). The findings suggest that the environmental element is the predominant aspect, with a score of 3.06, indicating that Kabul University is performing exceptionally well in terms of environmental considerations and actions. The university's social sustainability dimension achieved a score of 2.3, indicating a moderate level of development in addressing the social aspects of sustainability, such as equity, community participation, and social well-being. However, the issue of economic sustainability is significantly lagging, as evidenced by a low score of 0.8, emphasizing a critical area that requires immediate attention and improvement.

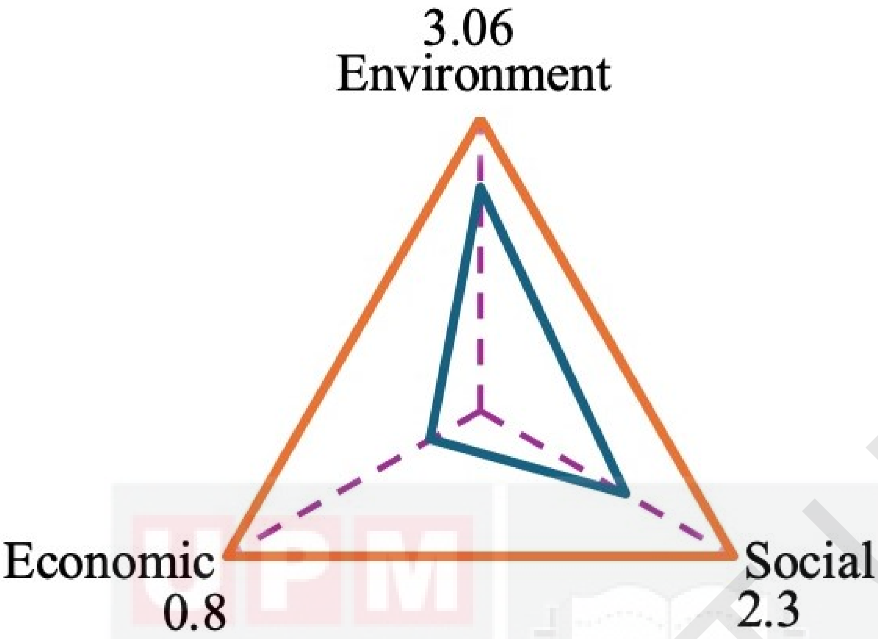

Figure 4.3 : Graphical representation of the OLCSA results

Considering the Figure 4.3 sustainability triangle analysis of Kabul University highlights an inequity among the three dimensions of sustainability (social, environmental, and economic). However, the orange color is indicate the sustainability triangle and the blue color indicate the result obtained for Kabul University. The results indicate that the environmental factor is the most dominant aspect, with a score of 3.06, implying that Kabul University is excelling in terms of environmental considerations and activities. The university's social sustainability dimension has a score of 2.3, indicating moderate progress in addressing social dimensions of sustainability, including equity, community participation, and social well-being. Nevertheless, the aspect of economic sustainability is notably falling behind, as indicated by a low score of 0.8, highlighting a crucial area that demands urgent attention and enhancement.

The difference in the sustainability triangle underscores some crucial factors. Kabul University demonstrates a notable emphasis on environmental measures. These initiatives may encompass efforts in resource conservation, waste management, or the development of green infrastructure. The social dimension, although less prominent than the environmental aspect, exhibits a moderate level of advancement, indicating that the university is actively striving to tackle social concerns and foster community involvement. The university's weak economic dimension is a notable concern, suggesting that it may be facing challenges in terms of financial sustainability, resource allocation, or economic viability of its activities.

In order to utilize this visualization for decision-making and planning for sustainability improvement, it is crucial to comprehend the interconnections among various variables. For example, the robust environmental performance indicates that Kabul University has efficient resource conservation and environmental management policies. Nevertheless, the underwhelming economic performance highlights the necessity for smart financial planning and efficient utilization of resources. By prioritizing enhancements to the economic aspect, the university can attain a more equitable sustainability profile.

The sustainability triangle can also be used to explore how the university's sustainability performance might change over time under different scenarios. For example, if Kabul University was to secure additional funding sources or partnerships, the economic dimension could improve, leading to a more balanced triangle. Conversely, if environmental initiatives were deprioritized, the environmental score might decrease, resulting in a less sustainable overall profile. This dynamic view of sustainability performance can help the university plan for various future scenarios and make informed decisions.

Consequently, to enhance its overall sustainability considering this visualization result, Kabul University should focus on maintaining and further developing its environmental initiatives, reinforcing its social sustainability practices, and prioritizing the enhancement of its economic sustainability through strategic planning, resource optimization, and potentially exploring additional funding sources or partnerships. This research is consistent with the concept of the integrative sustainability triangle, which highlights the importance of achieving equilibrium among the three elements in order to achieve genuine sustainability. The notable discrepancy in the triangle of Kabul University indicates the necessity for a comprehensive approach to sustainability, with a specific focus on enhancing economic sustainability while upholding strengths in environmental and social domains.

Comparing the sustainability triangle of Kabul University in relation to that of other institutions or sectors offers significant contextual information and a basis for comparison. Universities in comparable circumstances may possess distinct advantages and disadvantages, thereby illuminating opportunities for enhancement. In addition, incorporating alternative visualization techniques, such as radar maps or dashboards, can enhance the sustainability triangle and offer a more holistic assessment of sustainability performance (Sala et al., 2015).

In conclusion, the sustainability triangle visualization offers a valuable instrument for comprehending the comparative strength and weaknesses of Kabul University's sustainability performance. The university may bolster its overall sustainability through the analysis of interconnections across many variables, utilizing visualizations for decision-making and improvement planning, examining dynamic scenarios, and benchmarking against other institutions.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Chapter 4 provides data that enable a comprehensive conclusion regarding the sustainability performance of Kabul University in terms of social, environmental, and economic issues. This chapter consolidates the results obtained from the organizational life cycle assessment (O-LCA), life cycle costing (LCC), and social organizational life cycle assessment (SO-LCA) investigations. It emphasizes the significant connections and compromises that exist among these different dimensions of sustainability. Furthermore, the research explores the wider consequences for sustainable development in Afghanistan's higher education sector, as well as the contributions of the study to the field of assessing organizational sustainability. The findings of the integration of O-LCA, LCC, and SO-LCA reveal important interactions and trade-offs between environmental, economic, and social dimensions of sustainability. Kabul University does very well in terms of environmental sustainability with a score of 3.06, while its economic sustainability lags significantly with a score of 0.8. This finding reveals that the university's strong environmental initiatives may not be financially sustainable in the long term without strategic financial planning and resource optimization. Similarly, the moderate social sustainability score of 2.3 indicates that while there are positive aspects for job satisfaction and community participation, issues like sexual harassment, health, and safety concerns need urgent attention and must be addressed accordingly. These data show how these different aspects of sustainability are connected and affected by each other in important ways. They also show that a balanced approach is needed to truly achieve organizational sustainability. The broader implications of the research findings for sustainable development in Afghanistan's higher education sector are significant for overall improvement and a healthy environment. By addressing the identified findings and working to improve the weaknesses in economic and social sustainability, Kabul University can serve as a model for other institutions in the region, especially other educational institutions in Afghanistan. This includes implementing policies to enhance gender balance, improve health and safety facilities, and develop comprehensive financial strategies. Such measures align with the UN Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 11 (Sustainable Cities and Communities).

The contribution of the study to the field of organizational sustainability assessment is multifaceted. By utilizing a comprehensive methodology that integrates O-LCA, LCC, and SO-LCA, this research provides a holistic assessment of sustainability performance. This combined approach is particularly valuable in the context of developing countries and post-conflict settings, where resource constraints and unique social challenges necessitate tailored sustainability strategies. The findings underscore the importance of balancing environmental, economic, and social dimensions, revealing that strong performance in one area does not necessarily translate to overall sustainability without corresponding efforts in other dimensions of sustainability.

The sustainability triangle visualization effectively depicts the discrepancy between the scores of environmental, social, and economic dimensions of 3.06, 2.3, and 0.8, respectively. The significant difference highlights the pressing requirement for Kabul

University to enhance its strategies for economic sustainability while upholding its comparatively commendable performance in social and environmental aspects.

Moreover, the sustainability scoring methodology provides a comprehensive synthesis of the O-LCA, LCC, and SO-LCA results. By implementing these diverse assessments, the methodology offers a holistic evaluation of Kabul University's sustainability performance. However, it is important to acknowledge the methodological challenges and limitations, including the available subjectivity in the scoring process for full implementation of the assessment. Conducting a sensitivity analysis and involving stakeholders in the weighting process of the assessment can further assist in addressing these challenges and enhance the robustness of the sustainability assessment. This research mainly contributes to a broader understanding of sustainability in higher education institutions (HEIs), particularly in developing nation settings, and offers both theoretical and practical insights to enhance institutional sustainability performance.

To summarize, although Kabul University exhibits certain strengths in terms of social and environmental sustainability, there are substantial areas that require improvement in all aspects. In order to improve its social performance, the institution should give priority to addressing concerns such as sexual harassment, gender balance, and the provision of students' health and safety facilities. Environmental measures should prioritize mitigating the effects of mobility and energy consumption. Primarily, the university must create and execute strong plans to enhance its economic viability, which is currently far inferior compared to other aspects. By focusing on these specific areas, Kabul University can strive for a more equitable and all-encompassing approach to maintaining its organizational sustainability, thereby establishing a more influential model for HEIs in Afghanistan and other regions.

Regarding the first objective, which is to evaluate the environmental impacts of higher education services in Kabul University based on O-LCA, it is found that the university excels in environmental sustainability with a score of 3.06. This indicates that Kabul University has implemented effective environmental management practices. These results contribute to the understanding of how HEIs in developing countries can successfully manage their environmental footprint despite resource limitations.

In addressing the second objective, which is to calculate the cost of higher education facilities and services in Kabul University using LCC, the analysis revealed significant challenges in economic sustainability, with a score of only 0.8. This low score suggests that the university's strong environmental initiatives may not be financially sustainable in the long term without strategic financial planning and resource optimization. This finding highlights the need for improved economic strategies in HEIs operating in post-conflict settings.

For the third objective, which is to assess the social performance of Kabul University considering SO-LCA, the study found a moderate social sustainability score of 2.3. Although there are positive aspects such as job satisfaction and community participation, issues like sexual harassment, health, and safety concerns need urgent action. This assessment provides valuable insights into the social dynamics within HEIs in Afghanistan and identifies critical areas for improvement.

The final objective, which is to visualize the organizational life cycle sustainability assessment (OLCSA) at Kabul University based on the integration of O-LCA, LCC, and SO-LCA, revealed significant differences between environmental, social, and economic sustainability dimensions. The sustainability triangle visualization effectively depicts these differences, highlighting the need for a more balanced approach to sustainability. This integrated assessment contributes to the broader field of sustainability in higher education by demonstrating the importance of considering all three dimensions simultaneously, especially in developing and post-conflict contexts.

5.2 Achievements and Contributions

This study's integration of O-LCA, Life Cycle Costing (LCC), and Social Life Cycle Assessment (SO-LCA) in a post-conflict setting provides a novel framework for assessing sustainability in a resource-limited context, addressing a significant gap in the literature on higher education sustainability. By applying this comprehensive approach to Kabul University, this research provides valuable insights into the unique challenges and opportunities for sustainability in HEIs operating in post-conflict countries.

This study presents research findings with significant contributions and successes to the field of sustainability assessment for HEIs, specifically in the context of Kabul University as follows:

- Comprehensive approach: The study considers social, environmental, and economic dimensions, offering a thorough understanding of institutional sustainability. This comprehensive approach exceeds previous research that may have concentrated on individual components, providing a more comprehensive perspective on sustainability performance.

- Stakeholder-centric analysis: The study collected and integrated perspectives from many stakeholder groups, including academic staff, administrative staff, and students. This comprehensive stakeholder analysis improves the understanding of sustainability issues within the institution by offering a more comprehensive viewpoint.

- Application of life cycle assessment (LCA): The study involves the utilization of the O-LCA approach to assess and analyze environmental implications. Applying LCA to an HEI in Afghanistan is a unique and innovative contribution to the discipline. This application is particularly significant in the context of Afghanistan, where resource is limited and post-conflict challenges require innovative approaches for sustainability assessment.

- Economic impact assessment: This assessment incorporates a comprehensive LCC analysis, providing a valuable understanding of the financial aspects of university operations. This improves the understanding of the financial impacts of sustainability activities in higher education.

- Environmental implications: This study aims to identify and quantify the precise environmental implications of university activities, including but not limited to global warming potential, resource depletion, and environmental impacts. This comprehensive research yields significant data for accurate environmental solutions.

- Social performance measures: The finding of the study creates and utilizes measures to assess social sustainability, encompassing factors like job satisfaction, fare salary, discrimination, health and safety, social benefits, employment relationship, and sexual harassment. These measures contribute to the wider subject of assessing social sustainability in corporate settings.

- Visualization of a sustainability triangle: The utilization of a sustainability triangle for visualizing the comparative performance in social, environmental, and economic dimensions offers a novel approach to effectively convey intricate sustainability data.

- Insights to Afghanistan higher education: By focusing on Kabul University, this study offers significant insights into the unique sustainability difficulties and opportunities faced by HEIs in Afghanistan. This contributes to a larger comprehension of sustainability in developing nation settings.
- Methodological framework: The study utilizes a comprehensive methodology that integrates multiple assessment methods and methodologies. This framework can be customized and utilized for sustainability assessments of other HEIs.
- Post-conflict context analysis: This study provides a unique perspective on sustainability assessment in a post-conflict context, addressing the specific challenges and opportunities faced by HEIs in such settings. This contributes to the broader understanding of sustainability in developing and conflict-affected countries.

The focus of the study on a post-conflict context provides valuable information on how sustainability can be assessed and improved in resource-constrained settings, providing a model for other organizations in similar contexts. The combined contributions enhance the comprehension of sustainability in HEIs, specifically in developing nation settings, and offer both theoretical and practical insights to enhance institutional sustainability performance. The findings of this study align with the United Nations SDGs, particularly SDG 4 (Quality Education) and SDG 11 (Sustainable Cities and Communities). By addressing the identified weaknesses in economic and social sustainability, Kabul University can serve as a model for other institutions in the region, implementing policies to enhance gender balance, improve health and safety facilities, and develop comprehensive financial strategies.

Furthermore, Kabul University can be set as an example by addressing the above-stated weakness of other HEIs for a healthy, ethical, and positive learning environment. This will further improve not solely learners' learning motivation but will also further enhance positive motivation and working environment for all faculty, staff, and other entities. Moreover, this study contributes to the wider field of sustainability assessment by presenting how integrated approaches can be adapted and applied in challenging, post-conflict countries. The methodological framework established in this study can serve as a foundation for future research on sustainability in HEIs operating in similar contexts.

5.3 Recommendations

Drawing from the extensive research findings outlined in Chapter 4, the following recommendations are strategically prioritized to enhance Kabul University's overall sustainability performance. These recommendations consider their potential impact, feasibility, and alignment with Kabul University's mission and available resources. They are designed to address both immediate issues and long-term sustainability goals.

1. Enhance economic sustainability: Develop a comprehensive financial strategy, including diversifying funding sources and optimizing resource allocation. This is important given the low economic sustainability score (0.8) and its potential to undermine other sustainability efforts. Specific actions include exploring new revenue-generating activities, implementing cost-saving measures, and seeking partnerships with the private sector, as well as national and international organizations for funding and resources.

2. Gender balance and safety can be improved by creating and applying a gender balance policy in both the staff and student body, implementing and upholding

more stringent regulations to combat sexual harassment, and conducting regular training initiatives and awareness programs for both staff and students.

3. Enhance health and safety facilities: Give priority to improving health and safety facilities for students and staff, addressing significant areas of concern. This may involve upgrading healthcare facilities on campus, enhancing campus security measures, and ensuring regular maintenance of infrastructure.

4. Implement environmental initiatives: Focus on mitigating the environmental impacts, particularly in high resource consumption. Among the recommended initiatives include adopting renewable energy sources, improving energy efficiency in buildings, encouraging sustainable transportation options, and implementing the circular economy principles in university operations.

5. Develop sustainability education and capacity building: Integrate sustainability rules across all disciplines and university operations. These include incorporating sustainability curricula, providing sustainability training to students and staff, and establishing a sustainability office to coordinate all efforts in the university.

6. Enhance stakeholder engagement and transparency: Improve and establish methods to increase the participation of all stakeholder groups in university decision-making processes, specifically in regard to sustainability initiatives. This involves developing a robust feedback mechanism; enhance transparency in all aspects of university operations, especially in the decision-making procedures; and regularly engaging stakeholders in sustainability planning and implementation and foster trust among stakeholders to enhance overall satisfaction.

7. Address ethnic and religious diversity: Enact policies and initiatives that foster inclusivity and respect for the varied ethnic and religious heritages existing within the university community. This includes creating and implementing such policies to describe the importance of religious and cultural diversity, and organizing cultural awareness programs and events.

8. Establish regular sustainability assessment: Develop a comprehensive methodology to regularly assess and evaluate the university's sustainability performance across all aspects. Utilize these evaluations to direct ongoing enhancement endeavors.

Overall, these recommendations are advised to address both immediate concerns and long-term sustainability goals. By prioritizing economic sustainability, gender balance, and environmental initiatives, while also focusing on capacity building and stakeholder engagement, Kabul University can improve its overall sustainability performance. Regular assessment and adaptation of these strategies will be significant for long-term achievements and for establishing Kabul University as a model for sustainable HEIs in Afghanistan and beyond.

5.4 Limitations and Future Research

Although this study provides a lot about how sustainable Kabul University is, it is important to be aware of its flaws and suggest places where more research is needed. Among the limitations of this study include:

1. Data availability: This study is constrained by the lack of data in some areas, especially long-term economic data and detailed measurements of environmental impacts. As Afghanistan is still recovering from a war, it is hard to obtain complete historical data, which may have limited the depth of this research.

2. Scope of study: The limited concentration on a single institution restricts the applicability of the findings to other HEIs in Afghanistan or similar other post-conflict countries.

3. Stakeholder representation: Regardless of attempts to include a wide range of stakeholders' viewpoints, some groups may have been inadequately represented due to limited access or cultural restrictions.

4. Temporal nature of data: This study provides a temporal representation of sustainability performance at a certain moment, which may not reflect long-term patterns or the influence of current measures.

In order to overcome these limitations and make progress in the sector, future research may consider the following recommendations:

1. Conduct longitudinal studies to gain insights into the temporal assessment of sustainability performance in post-conflict contexts. This could aid in the identification of the long-term impacts of sustainability measures and the progression of barriers encountered by institutions such as Kabul University.

2. Expand the range of the study to include various HEIs in Afghanistan or other post-conflict regions. This would enable the assessment and comparison of data, potentially leading to findings that may be applied to a wide scope.

3. Develop approaches for collecting data in regions with limited resources, with a specific focus on economic and environmental variables. This may involve forming partnerships with local organizations or the use of innovative technologies for data collection.

4. Investigate the impact of cultural and social elements on sustainability initiatives in higher education, specifically in the post-conflict context. This could provide valuable perspective into how to adjust sustainability strategies to specific cultural contexts.

5. Examine the correlation between sustainability performance and educational achievements in HEIs in post-conflict areas. This could aid in rationalizing and ranking sustainability activities in contexts with limited resources.

6. Conduct in-depth research on the implementation and effectiveness of the suggestions outlined in this report and monitor their impacts on Kabul University's long-term sustainability performance.

By addressing these limitations and exploring these options for future research, a more thorough understanding of sustainability in HEIs in post-conflict and developing countries can be gained. This will not only add to the scholarly discussion, but will also provide practical advice for policymakers and institutional leaders looking to create more sustainable and resilient HEIs.

5.5 Transferability of Findings

Although the primary focus of this study is Kabul University, the methodological approach and findings have the potential to be applied to other HEIs and universities in Afghanistan with comparable post-conflict contexts. Ensuring the applicability and generalizability of this study's methodology and findings is a crucial factor in broadening the influence of this research.

The integrated methodology consisting of O-LCA, LCC, and SO-LCA provides a comprehensive framework that may be customized for implementation in other institutions. Important factors to be considered for such modifications are:

1. Contextual adaptation is essential to tailor individual indicators and metrics to the distinct circumstances of each institution, even though the common framework can be applied globally. This may involve adapting social indicators to align with specific cultural norms or revising environmental assessments to address area environmental issues.

2. Resource considerations: The level of specificity in the assessment may require modification depending on the resources and data accessibility of the

organization. Smaller institutions or those in resource-limited contexts may be required to streamline key components of the assessment.

3. Stakeholder engagement: The method of identifying and engaging the stakeholders should be customized to fit the unique community and organizational structure of each organization.
4. The prioritization of sustainability dimensions can change based on an institution's mission, location, and specific challenges. The relative significance of environmental, social, and economic sustainability may vary in each case.
5. Policy environment: The applicability of specific recommendations may be influenced by the policies at the national and local levels. Organizations should assess the potential impacts of various regulatory frameworks on the implementation of sustainability programs.
6. Capacity building: To ensure a successful transfer of this approach, it may be necessary to provide training to staff members in sustainability assessment methodologies and assist in the development of data collection systems within the target institution.

The results of this study, including those relating to gender equality, economic viability problems, and environmental efforts, are likely to be applicable to other universities in Afghanistan and comparable post-conflict countries. Nevertheless, the precise expression of these problems and the optimal remedies may differ. By adopting the methodology used in this study and taking into account its results, other organizations can design their own thorough assessments of sustainability. This can improve a more comprehensive understanding of sustainability in higher education across many contexts and promote the exchange of exemplary methods and knowledge gained.

To summarize, although the findings of this study are specific to Kabul University, the methodology and overall insights provide useful knowledge that may be applied to promote sustainability in higher education, especially in difficult and resource-limited settings.

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APPENDICES

Appendix A

Statistics of Students in Kabul University in 2021

احصائیه محصلین بخش روزانه سال 1399 پوهنتون کابل به اساس دیپارتمنت به تفکیک جنسیت

پوهنحی Faculty	دیپارتمنت / رشته Department	صنف اول 1st class			صنف دوم 2nd Class			صنف سوم 3rd Class			صنف چهارم 4th Class			صنف پنجم 5th Class			مجموع عمومی Total		
		ذکور Boys	اناث Girls	مجموع Total	ذکور Boys	اناث Girls	مجموع Total	ذکور Boys	اناث Girls	مجموع Total	ذکور Boys	اناث Girls	مجموع Total	ذکور Boys	اناث Girls	مجموع Total	ذکور Boys	اناث Girls	مجموع Total
ادبیات زبانهای خارجی Literature and Foreign Languages	عربی	29	27	56	41	28	69	36	18	54	0	0	0	0	0	0	106	73	179
	روسی	36	20	56	15	26	41	23	29	52	0	0	0	0	0	0	74	75	149
	چینائی	29	15	44	36	3	39	18	5	23	0	0	0	0	0	0	83	23	106
	ترکی	19	27	46	12	24	36	8	22	30	0	0	0	0	0	0	39	73	112

	انگلیسی	67	61	128	50	59	109	46	49	95	0	0	0	0	0	0	163	169	332
	اسپانیوی	16	17	33	15	10	25	9	15	24	0	0	0	0	0	0	40	42	82
	آلمانی	14	18	32	14	22	36	15	23	38	0	0	0	0	0	0	43	63	106
	فرانسوی	17	14	31	9	15	24	9	19	28	0	0	0	0	0	0	35	48	83
مجموع (8) دیپارتمنت		**227**	**199**	**426**	**192**	**187**	**379**	**164**	**180**	**344**	**0**	**0**	**0**	**0**	**0**	**0**	**583**	**566**	**1149**
	نقاشی	11	24	35	13	29	42	15	6	21	0	0	0	0	0	0	39	59	98
	گرافیک دیزاین	40	6	46	33	13	46	36	10	46	0	0	0	0	0	0	109	29	138
	مجسمه سازی	10	29	39	6	18	24	7	19	26	0	0	0	0	0	0	23	66	89
هنرهای زیبا	فوتوگرافی	29	15	44	26	8	34	19	8	27	0	0	0	0	0	0	74	31	105
Fine Art	تیاتر	37	8	45	18	13	31	24	6	30	0	0	0	0	0	0	79	27	106
	سینما	23	9	32	25	1	26	26	0	26	0	0	0	0	0	0	74	10	84
	موسیقی	26	8	34	11	7	18	15	2	17	0	0	0	0	0	0	52	17	69
	ادبیات نمایشی	12	38	50	11	26	37	11	17	28	0	0	0	0	0	0	34	81	115
مجموع (8) دیپارتمنت		**188**	**137**	**325**	**143**	**115**	**258**	**153**	**68**	**221**	**0**	**0**	**0**	**0**	**0**	**0**	**484**	**320**	**804**
	انرژی	54	2	56	22	5	27	26	1	27	0	0	0	0	0	0	102	8	110
انجنیری	برق والکترونیک	59	0	59	54	1	55	30	0	30	0	0	0	0	0	0	143	1	144
Engineering	مهندسی	42	21	63	43	23	66	27	9	36	0	0	0	28	11	39	140	64	204
	میخانیک	44	6	50	21	2	23	26	1	27	0	0	0	0	0	0	91	9	100

	طراحی	45	20	65	28	16	44	0	0	0	0	0	0	0	0	0	73	36	109
	سیول	95	29	124	72	28	100	50	18	68	0	0	0	0	0	0	217	75	292
	مجموع (6) دیپارتمنت	**339**	**78**	**417**	**240**	**75**	**315**	**159**	**29**	**188**	**0**	**0**	**0**	**28**	**11**	**39**	**766**	**193**	**959**
ژورنالیزم Journalism	مطالعه ارتباطات	39	51	90	47	40	87	0	0	0	0	0	0	0	0	0	86	91	177
	روابط عامه	49	52	101	45	60	105	55	52	107	0	0	0	0	0	0	149	164	313
	ژورنالیزم	57	28	85	63	33	96	60	27	87	0	0	0	0	0	0	180	88	268
	مجموع (3) دیپارتمنت	**145**	**131**	**276**	**155**	**133**	**288**	**115**	**79**	**194**	**0**	**0**	**0**	**0**	**0**	**0**	**415**	**343**	**758**
زراعت Agriculture	اقتصادوتوسعه زراعتی	53	3	56	48	12	60	38	10	48	0	0	0	0	0	0	139	25	164
	اگرانومی	37	15	52	30	13	43	29	13	42	0	0	0	0	0	0	96	41	137
	حفاظه نباتات	44	14	58	29	18	47	25	11	36	0	0	0	0	0	0	98	43	141
	هارتیکلچر	37	16	53	38	15	53	26	11	37	0	0	0	0	0	0	101	42	143
	جنگلداری	36	17	53	24	12	36	28	14	42	0	0	0	0	0	0	88	43	131
	علوم حیوانی	34	19	53	16	11	27	19	9	28	0	0	0	0	0	0	69	39	108
	خاکشناسی وآبیاری	34	15	49	32	9	41	27	12	39	0	0	0	0	0	0	93	36	129
	بایوتکنالوژی وتولید تخم ها	45	13	58	34	16	50	42	7	49	0	0	0	0	0	0	121	36	157
	مجموع (8) دیپارتمنت	**320**	**112**	**432**	**251**	**106**	**357**	**234**	**87**	**321**	**0**	**0**	**0**	**0**	**0**	**0**	**805**	**305**	**1110**
روانشناسی وعلوم تربیتی	مدیریت آموزشی	11	37	48	8	34	42	12	28	40	0	0	0	0	0	0	31	99	130

Psychology and Education	پلان آموزشی	11	28	39	5	35	40	9	38	47	0	0	0	0	0	0	25	101	126
	روانشناسی	12	30	42	11	22	33	13	37	50	0	0	0	0	0	0	36	89	125
	پیداگوژی	12	32	44	7	18	25	7	32	39	0	0	0	0	0	0	26	82	108
	مشاوره	4	42	46	7	31	38	5	36	41	0	0	0	0	0	0	16	109	125
	کاراجتماعی	9	31	40	11	28	39	6	33	39	0	0	0	0	0	0	26	92	118
	مجموع (6) دیپارتمنت	**59**	**200**	**259**	**49**	**168**	**217**	**52**	**204**	**256**	**0**	**0**	**0**	**0**	**0**	**0**	**160**	**572**	**732**
	منجمت واداره تشبثات	71	53	124	64	54	118	73	27	100	0	0	0	0	0	0	208	134	342
	اقتصاد ملی	69	40	109	80	42	122	78	31	109	0	0	0	0	0	0	227	113	340
اقتصاد	امورمالی وبانکی	52	56	108	69	48	117	95	39	134	0	0	0	0	0	0	216	143	359
Economic	احصائیه واکونومتری	59	49	108	76	43	119	48	31	79	0	0	0	0	0	0	183	123	306
	محاسبه	45	17	62	34	21	55	32	11	43	0	0	0	0	0	0	111	49	160
	MIS	0	0	0	0	0	0	30	18	48	0	0	0	0	0	0	30	18	48
	مجموع (6) دیپارتمنت	**296**	**215**	**511**	**323**	**208**	**531**	**356**	**157**	**513**	**0**	**0**	**0**	**0**	**0**	**0**	**975**	**580**	**1555**
	دری	54	101	155	45	113	158	39	108	147	0	0	0	0	0	0	138	322	460
ادبیات زبانهای داخلی	پشتو	79	97	176	42	89	131	32	96	128	0	0	0	0	0	0	153	282	435
	اوزبکی	10	5	15	0	0	0	0	0	0	0	0	0	0	0	0	10	5	15
	مجموع (3) دیپارتمنت	**143**	**203**	**346**	**87**	**202**	**289**	**71**	**204**	**275**	**0**	**0**	**0**	**0**	**0**	**0**	**301**	**609**	**910**
علوم اجتماعی	تاریخ عمومی	11	63	74	9	57	66	14	45	59	0	0	0	0	0	0	34	165	199

Social Science	فلسفه وجامعه شناسی	31	31	62	17	18	35	13	12	25	0	0	0	0	0	0	61	61	122
	بشرشناسی وباستانشناسی	25	43	68	27	37	64	26	38	64	0	0	0	0	0	0	78	118	196
	مجموع (3) دیپارتمنت	**67**	**137**	**204**	**53**	**112**	**165**	**53**	**95**	**148**	**0**	**0**	**0**	**0**	**0**	**0**	**173**	**344**	**517**
زمین شناسی Geoscience	جغرافیه	34	28	62	19	40	59	19	17	36	0	0	0	0	0	0	72	85	157
	جیولوجی	34	14	48	30	14	44	35	12	47	0	0	0	0	0	0	99	40	139
	هایدرومیتورلوژی	33	21	54	27	16	43	26	11	37	0	0	0	0	0	0	86	48	134
	مجموع (3) دیپارتمنت	**101**	**63**	**164**	**76**	**70**	**146**	**80**	**40**	**120**	**0**	**0**	**0**	**0**	**0**	**0**	**257**	**173**	**430**
حقوق وعلوم سیاسی Law and Political Science	قضاء وحارنوالی	95	76	171	76	70	146	74	101	175	0	0	0	0	0	0	245	247	492
	اداری ودیپلوماسی	122	65	187	74	79	153	93	64	157	0	0	0	0	0	0	289	208	497
	مجموع (2) دیپارتمنت	**217**	**141**	**358**	**150**	**149**	**299**	**167**	**165**	**332**	**0**	**0**	**0**	**0**	**0**	**0**	**534**	**455**	**989**
محیط زیست Environment	علوم محیط زیست	32	13	45	42	6	48	27	6	33	0	0	0	0	0	0	101	25	126
	منابع طبیعی	28	19	47	25	26	51	22	6	28	0	0	0	0	0	0	75	51	126
	مدیریت حوادث	24	16	40	27	16	43	15	15	30	0	0	0	0	0	0	66	47	113
	مجموع (3) دیپارتمنت	**84**	**48**	**132**	**94**	**48**	**142**	**64**	**27**	**91**	**0**	**0**	**0**	**0**	**0**	**0**	**242**	**123**	**365**
کمپیوترساینس Computer Science	تکنالوژی معلوماتی	63	30	93	41	29	70	47	30	77	0	0	0	0	0	0	151	89	240
	سیستم های معلوماتی	54	28	82	50	29	79	43	28	71	0	0	0	0	0	0	147	85	232
	انجنیری نرم افزار	59	30	89	47	19	66	52	30	82	0	0	0	0	0	0	158	79	237

	مجموع (3) دیپارتمنت	**176**	**88**	**264**	**138**	**77**	**215**	**142**	**88**	**230**	**0**	**0**	**0**	**0**	**0**	**0**	**456**	**253**	**709**
شرعیات	تعلیمات اسلامی	14	98	112	70	102	172	76	118	194	0	0	0	0	0	0	160	318	478
Sharia	فقه وقانون	79	0	79	76	0	76	65	0	65	0	0	0	0	0	0	220	0	220
	مجموع (2) دیپارتمنت	**93**	**98**	**191**	**146**	**102**	**248**	**141**	**118**	**259**	**0**	**0**	**0**	**0**	**0**	**0**	**380**	**318**	**698**
فزیک	عمومی	**80**	**68**	**148**	**58**	**60**	**118**	**54**	**45**	**99**	**0**	**0**	**0**	**0**	**0**	**0**	**192**	**173**	**365**
کیمیا	عمومی	**58**	**59**	**117**	**57**	**47**	**104**	**45**	**47**	**92**	**0**	**0**	**0**	**0**	**0**	**0**	**160**	**153**	**313**
ریاضیات	عمومی	**75**	**55**	**130**	**70**	**60**	**130**	**47**	**45**	**92**	**0**	**0**	**0**	**0**	**0**	**0**	**192**	**160**	**352**
بیولوژی	عمومی	**67**	**56**	**123**	**36**	**66**	**102**	**21**	**38**	**59**	**0**	**0**	**0**	**0**	**0**	**0**	**124**	**160**	**284**
اداره وپالیسی عامه	عمومی	**83**	**82**	**165**	**83**	**77**	**160**	**72**	**74**	**146**	**0**	**0**	**0**	**0**	**0**	**0**	**238**	**233**	**471**
فارمسی	عمومی	**88**	**70**	**158**	**63**	**44**	**107**	**64**	**53**	**117**	**0**	**0**	**0**	**86**	**23**	**109**	**301**	**190**	**491**
علوم وترنری	عمومی	**102**	**13**	**115**	**77**	**7**	**84**	**71**	**5**	**76**	**0**	**0**	**0**	**42**	**5**	**47**	**292**	**30**	**322**
	مجموع ازصنف اول الی صنف پنجم	**3050**	**2313**	**5363**	**2586**	**2152**	**4738**	**2375**	**1878**	**4253**	**0**	**0**	**0**	**156**	**39**	**195**	**8167**	**6382**	**14549**

قرار شرح فوق احصائیه هذا ترتیب واحتراما تقدیم است .

تعداد محصلین ذکور (8167) تعداد محصلین اناث (6382) تعداد مجموع محصلین ذکور واناث (14549) فیصد محصلین ذکور(56.13%) اناث (43.86%)

ترتیب کننده احصائیه : محمدشهیم "رحیمی" مدیردیتابیس آمریت امورمحصلان پوهنتون کابل تاریخ 28 / جوزا / 1399

Appendix B

Questionnair of Socila Organizational Life Cycle Assessment (SO-LCA) of Kabul University

Code-AC				

FACULTY OF FORESTRY AND ENVIRONMENT

UNIVERSITI PUTRA MALAYSIA

Organizational Life Cycle Assessment (SO-LCA) of Kabul University

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Dear Sir/Madam,

I am a PhD candidate in Faculty of Forestry and Environment, Universiti Putra Malaysia. My research focuses on the organizational social life cycle sustainability assessment (OLCSA) of Kabul University. This questionnaire was developed to collect data on the direct/indirect social impacts of higher education at Kabul University, Afghanistan using the method of Social Organizational Life Cycle Assessment (SO-LCA) adopting the UNEP 2020 guidelines for social life cycle assessment and Social Organizational Life Cycle Assessment. The questionnaire is comprised from eight sections; 1) Respondent's demography, 2) Job Satisfaction, 3) Fair Salary, 4) Discrimination/ Equal Opportunity, 5) Health and Safety, 6) Social Benefits / Social Security, 7) Employment Relationship, and 8) Sexual Harassment. The questionnaire should only take around 10 minutes to complete. Your responses will be kept confidential. We value your honest and detailed responses.

Thank you.

Researcher:

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Supervisor:

Dr. Amir Hamzah Sharaai

Faculty of Forestry & Environment

Universiti Putra Malaysia
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WORKERS (ACADEMIC STAFF) QUESTIONNAIRE

SECTION I: PERSONAL BACKGROUND

Kindly provide the information on your background. Please select a relevant response or write in the boxes

1. Gender: [ ] Male
   [ ] Female

2. Age: [ ] 20– 30 years old
   [ ] 31– 40 years old
   [ ] 41– 50 years old
   [ ] 51– 60 years old
   [ ] above 60

3. Level of Education
   [ ] Bachelor
   [ ] Master
   [ ] PhD
   [ ] Post PhD

4. Academic Rank
   [ ] Nominated Lecturer
   [ ] Junior Lecturer
   [ ] Senior Lecturer
   [ ] Assistant Professor
   [ ] Associate Professor
   [ ] Professor

5. Race [ ] Pashtun
   [ ] Tajik
   [ ] Hazara
   [ ] Uzbek
   [ ] Others_________

6. Madhab [ ] Sunni
   [ ] Shia
   [ ] Others_________

7. Marital Status [ ] Single
   [ ] Married
   [ ] others_________

8. Monthly income
   - [ ] up to 24,000 Afs
   - [ ] up to 27,000 Afs
   - [ ] up to 32,000 Afs
   - [ ] up to 36,000 Afs
   - [ ] up to 42,000 Afs
   - [ ] up to 48,000 Afs
   - [ ] up to 52,000 Afs or more

9. Number of households
   - [ ] 1 Person
   - [ ] 2 persons to 3 persons
   - [ ] 4 persons to 5 persons
   - [ ] 6 persons to 7 persons
   - [ ] 8 persons to 9 persons
   - [ ] 10 persons or more,
     Please state: -------------

10. Experience in Organization
   - [ ] Less than 3 years
   - [ ] 3 to 6 years
   - [ ] 7 to 12 years
   - [ ] 13 to 15 years
   - [ ] 16 to 18 years
   - [ ] 19 to 21 years
   - [ ] 22 to 24 & above

11. Designation:
   - [ ] Vice Chancellor
   - [ ] Dean of Faculty/ Institute
   - [ ] Deputy Dean of Faculty/ Institute
   - [ ] Chairman/Head of Department
   - [ ] Others, please state: --------------

SECTION II: Job Satisfaction

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please indicate whether you agree with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	My field of expertise is relevant to my current job responsibilities					
2	I enjoy my job.					
3	My tasks are already defined in higher education law and regulations.					
4	I fulfill my daily duties in its best form.					
5	I supervise students in their academic monographs.					
6	I am always struggling to do my assigned duties.					
7	I do my best in all my academic ranked related tasks.					
8	I am work based on our scope of department.					
9	I am assigned to numerous irrelevant tasks which restricted me from job promotion.					
10	There is unspecific job responsibilities which is affecting career professionalism.					
11	I represent my faculty in various technical committees inside as well as outside of university.					
12	I am actively participating in academic council meeting(s) of department.					
13	The Ministry of Higher Education provides me with opportunities of access to higher education to further improve my professional capacity.					
14	I keenly participate in short term programs to enhance my professional capacity.					
15	University provides me with adequate resources for my academic, teaching and learning activities.					
16	I publish my articles in national and international journals.					
17	I am able to obtain my academic promotion timely.					

SECTION III: Fair Salary

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please indicate whether you agree with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	My salary is fair for my work.					
2	I am receiving my salaries on time every month.					
3	Based on my need/request the university pays me my salary in advance too sometimes.					
4	I receive incentives for extra assignments.					
5	University is paying me the overtime regularly.					
6	I receive special yearly bonus from university.					
7	My revenue accumulation from the university is adequate to cover all of my expenditures.					
8	I am working in a private institutions part time.					
9	I receive an extra salary from other NGOs.					
10	In addition to working at the University, I am also employed elsewhere					
11	I am satisfied with my salary.					
12	I undertake too many tasks but my salary is low					
13	Salary is not estimated based on the daily market needs.					
14	There is unequitable salary distribution among academic and organizing staff.					
15	There is unsatisfied salary to fulfill daily needs.					
16	I am receiving per-diem when I am in national and international visit for academic programs and proceedings.					
17	University pays me the transportation and food allowances regularly.					
18	There is no financial incentive in form of house rent, insurance etc...					
19	There is no extra financial support for academia to promote career.					
20	There is low financial support to facilitate research activities.					

SECTION IV: Discrimination/ Equal Opportunity

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agreeing with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3) Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I have faced/witnessed race discriminations during my academic work.					
2	I have faced religious discriminations during my academic work.					
3	I have witnessed gender discriminations during my academic work.					
4	I have faced political discriminations during my academic work.					
5	I have witnessed various kinds of discriminations based on language.					
6	I have faced various kinds of discriminations dodging my academic promotion.					
7	I am motivated by university.					
8	My director/supervisor makes me endure illegal obligations to work in this organization.					
9	I am a victim of various types of discriminations regarding access to capacity enhancing and training opportunities in university					
10	I feel uncomfortable in my organization.					
11	All staff are working equally based on working hours.					
12	The university issues me paid and unpaid leaves without any discriminations.					
13	The equipment and facilities in organization/university are enough and it is appropriate for working.					
14	I feel comfortable to talk in my mother tongue in my organization.					
15	There are policies rules enforced to avoid the racial discriminations during recruitment process.					
16	The career ladder steps are strictly time bound to climb					
17	There is miss coordination due to ethnic, language and state discrimination.					

SECTION V: Health and Safety

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agreeing with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I know about the Occupational Health in safety.					
2	My organization/university is providing the health and safety workshop for staff.					
3	My organization/university provides the healthcare facility for us.					
4	I have got sickness due to my workload					
5	My workspace/university environment is well equipped to avoid injuries and incidents?					
6	There is no health insurance for staff. I do not receive					
7	There is personal protecting equipment distributed to avoid injuries. I received personal ……					
8	My organization/university provides me with facilities during snowy days to avoid diseases in winter?					
9	I am aware about emergency procedure in university.					
10	I believe that I am safe from terror attacks inside the university.					
11	I have a disability which reduces my potential of effective productivity.					
12	All staff received the coping capacity training to mitigate the security problem. I received ….					
13	The firefighting measures/equipment are installed in our offices					
14	The first aid kits are available in laboratories and offices					
15	The toilet facilities are well maintained and disinfected properly every day					
16	I am satisfied by the provided services of healthcare center in university					
17	The room temperature in classes is comfortable during winter seasons.					
18	My office is equipped with heating system during winter.					
19	The room temperature in laboratories is comfortable enough.					
20	There is no clear guideline to be implemented during any pandemic.					
21	There is no specific plan to cope during biological hazard.					
22	There is no proper facilitation and support for victims of hazards.					

SECTION VI: Social Benefits / Social Security

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agree with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3) Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	There is no job security in university.					
2	I receive social services in university.					
3	I have received threats to mine and my family's security due to working in this organization.					
4	My organization provides me with a house for accommodation.					
5	I am confident that the organization/university will provide me health service.					
6	My organization gives me food allowances or food stuff.					
7	We are given equal chances to use the university facilities and commodities.					
8	We receive social support for the losses due to terror attack, from the organization or government.					
9	My children can benefit from university kindergarten.					
10	I will easily have access to pension after I retire.					
11	I am/will be satisfied by pension policy.					
12	The health allowances or insurance is included in our retirement package.					
13	There are limited opportunities for me to work with other NGOs/Gov. stakeholders					
14	As knowledge provider community give honor to academia.					
15	We are involved in society in decision-making.					

SECTION VII: Employment Relationship

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agreeing with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3) Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	There is unnecessary involvement of top management in all activities.					
2	There is no support for junior staff.					
3	The top management misuse the resources.					
4	The top management is not taking responsibility.					
5	Top management avoid juniors from promotion					
6	Top management grasp on to all the opportunities, they do not extend them to juniors.					
7	Top management entertain nepotism in activities rather than competency.					
8	There is limited motivational support of top management.					
9	There is lack of coordination amongst top management and bottom managerial staff.					
10	Junior staff is not consider their responsibilities					
11	The senior academic staff in not supporting their juniors					
12	Senior and Junior staff is not cooperating in office.					
13	I am involved in decision-making in my organization.					
14	My director gives me irrelevant tasks.					
15	My director does not have the leadership skills.					
16	My boss always puts pressure on me.					

SECTION VIII: Sexual Harassment

For each of the statements below, please tick one option, which “best” reflects your true feeling. Please tell indicate whether you are agree with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3) Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	Sexual harassment a big threats in our organization					
2	I was faced with verbal requesting for sexual favors in Kabul University					
3	I was faced with written requesting for dating in Kabul University					
4	I was faced with unwanted physical contact in Kabul University					
5	I was faced with visual sexual harassment in Kabul University					
6	Sometimes my supervisor forced me for date during supervision					
7	I suffer from gender discrimination in Kabul University					
8	There is no gender consideration in recruitment process.					
9	I have been victim of sexual harassment in my academic work.					
10	I have seen victim of sexual harassment in my organization.					
11	Here is sexual harassment mitigation measures in Kabul University					
12	My supervisor is taking advantage of victims					
13	Here is retaliation against employees who report sexual harassment					
Additional comments:						

THANK YOU

WORKERS (ACADEMIC STAFF) QUESTIONNAIRE

SECTION I: PERSONAL BACKGROUND

Kindly provide the information on your background. Please select a relevant response or write in the boxes

1. Gender: [ ] Male
   [ ] Female

2. Age: [ ] 20– 30 years old
   [ ] 31– 40 years old
   [ ] 41– 50 years old
   [ ] 51– 60 years old
   [ ] above 60

3. Level of Education
   [ ]None
   [ ] 12th Grade
   [ ] Bachelor
   [ ] Master
   [ ] PhD

4. Race [ ] Pashtun
   [ ] Tajik
   [ ] Hazara
   [ ] Uzbek
   [ ] Others_________

5. Madhab [ ] Sunni
   [ ] Shia
   [ ] Others_________

6. Marital Status [ ] Single
   [ ] Married
   [ ] others_________

7. Monthly income
   [ ] up to 5000 Afs
   [ ] up to 10000 Afs
   [ ] up to 20000 Afs
   [ ] up to 30000 Afs
   [ ] up to 40000 Afs
   [ ] up to 400000 Afs
   [ ] up to 60000 Afs or more

8. Number of households
   [ ] 1 Person
   [ ] 2 persons to 3 persons
   [ ] 4 persons to 5 persons
   [ ] 6 persons to 7 persons
   [ ] 8 persons to 9 persons
   [ ] 10 persons or more,
   Please state: -------------

9. Experience in Organization
   [ ] Less than 3 years
   [ ] 3 to 6 years
   [ ] 7 to 12 years
   [ ] 13 to 15 years
   [ ] 16 to 18 years
   [ ] 19 to 21 years
   [ ] 22 to 24 & above

10. Designation:
   [ ] Director
   [ ] Coordinator
   [ ] Manager
   [ ] Technician
   [ ] Clerk
   [ ] Cleaner
   [ ] office Servant
   [ ] guard
   [ ] Others, please state: --------------

11. Working area/part
   [ ] Academic Vice Chancellor related Sections
   [ ] Admin/Finance Vice Chancellor related Sections
   [ ] Students Affairs Vice Chancellor related Sections
   [ ] Faculty/ Institute
   [ ] Library
   [ ] Hostel
   [ ] Others, please state: --------------

SECTION II: Job Satisfaction

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please indicate whether you agree with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I feel I can carry the assigned workload.					
2	I have the ability to perform the assigned tasks.					
3	The tasks and assignment is not explained clearly to me.					
4	I am always excited while performing assigned tasks.					
5	I am comfortable with given tasks in my office work.					
6	I am using my skills properly in my office work.					
7	I am cannot use my abilities properly in my office work.					
8	I participate in hazard and risk management training during my work.					
9	I feel happy with my current job related benefits.					
10	I am working in a friendly environment.					
11	The given work to me by director or supervisor is fair and based on my term of reference.					
12	The internet is very weak in university					
13	There is no system of rewards and punishment in the organization					
14	There are no proper facilities to carry out the assigned tasks.					
15	There are lots of punishments but no reward.					
17	We lack facilities and resources in office.					
18	The electricity blackouts affects our daily tasks.					

SECTION III: Fair Salary

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please indicate whether you agree with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I am receiving my salaries on time every month.					
2	My salary is not fair for my work.					
3	I receive incentives for extra assignments.					
4	I receive special yearly bonus from university.					
5	University is paying me the overtime regularly.					
6	My salary from the university is adequate to cover all of my expenditures.					
7	The university paid me my salary when I was legally ending my contract.					
8	University pay me the transportation allowances regularly.					
9	My salary is not enough for my daily life.					
10	I am receiving salary when I need before regular transection to my bank account.					
11	My overall income is not enough to cover all of my expenditures.					
12	University not paying me the food allowances.					
13	Me and other staff's monthly salary are delayed every time.					
14	Me and other staff's salaries are not budgeted equitably.					
15	There is no extra payment for overtime.					
16	The prices of basic needs are getting higher in market.					
17	The difference between salaries based on ranks is budgeted unfairly.					

SECTION IV: Discrimination/ Equal Opportunity

For each of the statements below, please tick one option, which “best” reflects your true feeling. Please tell indicate whether you are agreeing with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3) Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I have faced race discriminations during my office work.					
2	I have witnessed religious discriminations during my office work.					
3	I have faced gender discriminations in my office work.					
4	I am not facing political discriminations during my office work.					
5	I have not faced any kind of linguistic discriminations.					
6	My director makes me endure illegal obligations to work in this organization.					
7	There is no ethnic discrimination in organization					
8	All staff are working equally based on working hours.					
9	The university issues me paid and unpaid leaves without any discriminations.					
10	The equipment and facilities in organization/university are enough and it is appropriate for working.					
11	I feel comfortable to talk in my mother tongue in my organization.					
12	There are policies rules enforced to avoid the racial discriminations during recruitment process.					
13	I can nominate myself for different position which are announced in university.					
14	I can nominate myself for different position which are announced in other governmental departments outside the university.					
15	There is no discrimination during promotion process.					
16	I have equal chance to participate in office meetings.					
17	I am not motivated by organization					
18	There is no equal chance for capacity building to all the staff.					
19	Overtime is given based on nepotism and favoritism					
20	There are big punishments for small mistakes					

SECTION V: Health and Safety

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agreeing with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I know about the Occupational Health in safety.					
2	My organization is providing the health and safety workshop for staff.					
3	My organization does not provide good health care facility for staff in Kabul University.					
4	I have got sickness due to my workload.					
5	Our workspace environment is well equipped to avoid injuries and incidents.					
6	There is personal protecting equipment distributed to avoid injuries.					
7	Our organization/university provides us with facilities during snowy days to avoid diseases in winter?					
8	Me and other staff are aware about emergency procedure in university.					
9	I feel I am safe from terror attacks inside the university.					
10	I do not have any health problem during my job					
11	I get the training to mitigate the security problem.					
12	Firefighting equipment are not installed in offices.					
13	There are first aid kits available in laboratories					
14	The toilet facilities are well maintained.					
15	The toilets are not disinfected properly every day.					
16	The health care center inside the university providing services which is needed by staff.					
17	There are no proper amount of COVID-19 sanitizers available.					
18	There are not enough first aid facilities in my office					
19	No health insurance provided to me and other staff.					
20	No health vouchers are available for me.					

SECTION VI: Social Benefits / Social Security

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agree with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3) Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I have job security in university.					
2	I receive social services in university.					
3	I have never received threats to mine and my family's security due to working in this organization.					
4	My organization provides me with a house for accommodation.					
5	I am not confident that the organization/university will provide me health service.					
6	I do not have the equal chance to use the university's facilities and commodities.					
7	I will not receive any social support from the organization or government for the losses due to terror attack.					
8	Communities are respecting me for working in university.					
9	We have diversity of cultures in university.					
10	I feel proud in community due to my Job.					
11	I feel proud to be working in university.					
12	I feel proud to serve my country.					
13	Working with students and lecturers from diverse cultures improves social networking.					

SECTION VII: Employment Relationship

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agreeing with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3) Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	The top management is not taking responsibility.					
2	There is no support for junior staff.					
3	The top management misuse the resources.					
4	Top management grasp on to all the opportunities, they do not extend them to juniors.					
5	There is limited motivational support of top management.					
6	There is lack of coordination amongst top management and bottom managerial staff.					
7	My director/manger treats me very kindly.					
8	My director/manger is not supporting me in my office work.					
9	My director/manager is supervising me in my work.					
10	My director/manager gives me constructive feedback on my work.					
11	My director/manager gives swift response to my questions.					
12	In case any issue arises, my supervisor supports me resolve it.					
13	The mangers do not trust their staff.					
14	The authorities misbehave with staff.					
15	Authorities do not sign the documents on its time.					
16	My director/officer has good skills of decision-making.					
17	I am involved in decision-making in my organization.					
18	My boss always puts pressure on me.					

SECTION VIII: Sexual Harassment

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agree with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3) Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	Sexual harassment a big threats in our organization					
2	I was faced with verbal requesting for sexual favors in Kabul University					
3	I was faced with written requesting for dating in Kabul University					
4	I was faced with unwanted physical contact in Kabul University					
5	I was faced with visual sexual harassment in Kabul University					
6	Sometimes my supervisor forced me for date in office.					
7	There is no gender consideration in recruitment process.					
8	I have been victim of sexual harassment in office work.					
9	I have seen victim of sexual harassment in my organization.					
10	Here is sexual harassment mitigation measures in Kabul University					
11	Here is retaliation against employees who report sexual harassment					
Additional comments:						

THANK YOU

QUESTIONNAIRE FOR CONSUMERS (STUDENTS)

SECTION I: PERSONAL BACKGROUND

Kindly provide the information on your background. Please write or put a tick in the relevant boxes.

1. Gender: [ ] Male
   [ ] Female
2. Age:
   [ ] 18 years old – 25 years old
   [ ] 26 years old – 35 years old
   [ ] 36 years old – 40 years old
   [ ] 41 years old and above
3. Current Program [ ] Bachelor
   [ ] Master
   [ ] PhD
4. Faculty [ ]
5. Department [ ]
6. Semester [ ]
7. Race [ ] Pashtun
   [ ] Tajik
   [ ] Hazara
   [ ] Uzbek
   [ ] Other
8. Madhab [ ] Sunni
   [ ] Shia
   [ ] Other
9. Marital Status [ ] Single
   [ ] Married
   [ ] Divorced

SECTION II: Health and Safety

Please indicate whether the following statements are true or false by Yes or No:

No	Questions	YES	NO
1	Does your faculty have health and safety facilities?		
2	Do you feel comfortable in low temperature in classroom?		
3	Is there any fire safety guidance in your faculty?		
4	Do you feel fear during terror attack on your faculty?		
5	Are there any evacuation routes in your faculty building that you can utilize during terror attack or in case of fire?		
6	Do you feel safe during teaching learning process?		
7	Do you have received training for emergency response incidents?		
8	Does the noise interrupt your class sessions during lectures?		
9	Do you have personal protective equipment to use during field and laboratory work?		
10	Do you have access to first aid kit in your faculty?		
11	Does the faculty consider your feedback regarding health and safety issues?		
12	Do you or other students report the emergency issues to administration?		
13	Are the health and safety measures most important priority to university?		
14	Do overloaded lectures and activities causes you any health issues?		
15	Do you feel stressed due to lectures and activities?		
16	Does your faculty take action to avoid transmitted disease like COVID19?		
17	Have you ever thought about committing suicide during the studentship?		
18	In case of your health and safety issues, have you ever contacted administration or police inside the university.		
19	Have you ever faced a terror attack in university?		
20	Have you ever choked during class session?		
21	Have you ever received any medical assistance from university?		
22	Do you have any cooling facilities in class during summer?		
23	Is your faculty vulnerable against earthquake?		
24	Are there any safety measures during a war in your faculty?		

SECTION III: Feedback Mechanism

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agreeing with the following statements; Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I am satisfied with lecturer behaviors.					
2	I am satisfied with faculty services.					
3	Faculty provides the feedback mechanism each semester.					
4	Faculty authorities' follow up our problem with our lecturer based on students' feedbacks.					
5	I am providing feedback for administration services of the faculty too each semester.					
6	I feel that my feedback is considered and it is responded on time.					
7	I provide my feedback without any fear and discrimination.					
8	Our feedback mechanism needs to be improved.					
9	Staff and lecturers respond positively based on our feedback in faculty feedback mechanism.					
10	Faculty is strongly committed to resolve any problems based on our feedbacks.					
11	Our exam results are announced in timely manner.					
12	Our lecturers do not have any religious, ethnic and linguistic discrimination during teaching, learning and assessment process.					
13	I have not received satisfactory assistance in paper re-evaluation mechanism for marks objection after exam result.					
14	Our staff and faculties behaviors are motivating and supportive.					
15	Our lecturer are updated and use new references for teaching and learning activities.					
16	Faculty solve our problems based on our feedback					
17	There are no particular activities carried out to aim on encouragement of students.					
18	Lecturers follow their own teaching methods.					

SECTION IV: Privacy

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agreeing with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	University have privacy policy for students security					
2	We are afraid to criticize lecturers.					
3	Complaint against a lecturer will directly affect a student's graduation.					
4	Due to racism in university I cannot disclose my personal details.					
5	There is no privacy for students against lecturer					
6	Faculty expose our identity during feedback.					
7	I feel fear for my mark revision					
8	Here is no clear complaint mechanism in faculty					
9	Our information is expose to terror groups.					
10	My family at risk while I studying in university					
11	I am shame with low mark when faculty expose my marks publically					
12	University does not disclose my health record publically					
13	University does not disclose my education record publically					
14	University is using the highest standards of encryption on our databases, systems, and other tech tools					
15	I feel fear from sexual harassment in university					
16	Corruption is an issue in university of Kabul.					

SECTION V: Transparency

For each of the statements below, please tick one option, which “best” reflects your true feeling. Please tell indicate whether you are agreeing with the following statements Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	I received equal chance to use/utilize resources in faculty.					
2	The lecturers are affectionate towards all the students and there is no discrimination.					
3	During the exam the paper have cutting system and lecturer do not know about my name.					
4	I am satisfied with my CGPA.					
5	There is no transparency in university					
6	The lecturers are evaluating students based on their ethnicity					
7	The lecturers are evaluating students based on their religion					
8	The lecturers are evaluating students based on their language					
9	Students are discriminated during examinations.					
10	There is gender discrimination among male and female students					
11	I am satisfying from the selection procedure of students for international capacity building programs.					
12	Her is administrative corruption in our university					
13	Her is academic corruption in our university					
14	The university exam system is transparent					

SECTION VI: End-of-Life Responsibility

For each of the statements below, please tick one option, which "best" reflects your true feeling. Please tell indicate whether you are agreeing with the following statements; Strongly Disagree (1), Disagree (2), Moderately Agree (3), Agree (4), or Strongly Agree (5).

No	Questions	1	2	3	4	5
1	There is no guarantee for employment after graduation					
2	There are a lot of opportunities for jobs in our field					
3	Recommendations are needed for employment					
4	We cannot receive our graduation documents on time.					
5	I am encouraged to continue further study in Kabul University.					
6	I am interested to work in mu field					
7	University connects me with potential job employment opportunities					
8	My studied course will be useful in practical life.					
9	My gain skill will be useful during my job					
10	The knowledge I learning is useful in my expected job					
11	I am receiving my degree on time from university					
12	The graduation process is easy to be completed					
13	I know about accreditation of Kabul University					
14	I received syllabus at start of semester for each course					
15	I am achieving excellence in Kabul University which I have expected					
Comments:						

THANK YOU

Appendix C

Building Area Estimations of Kabul University Facilities

NO	Name	Length	Area	Stories	Total Area	Square Meter
1	Law and Psychology	555.61	4305.02	2.00	8610.04	4305.02
2	Auditorium	94.71	541.92	1.00	541.92	541.92
3	Cafeteria	81.56	393.41	1.00	393.41	393.41
4	Cafeteria	89.19	426.00	1.00	426.00	426.00
5	Cafeteria	109.61	700.31	1.00	700.31	700.31
6	Geoscience and Veterinary	448.93	3561.50	3.00	10684.49	3561.50
7	Journalism	118.00	658.83	4.00	2635.32	658.83
8	Faculty of Sharia	190.89	1541.00	2.00	3082.01	1541.00
9	Faculty of Sharia	74.60	350.61	2.00	701.23	350.61
10	Legal Institute	125.55	675.73	3.00	2027.19	675.73
11	Gymnasium	160.47	1242.79	1.00	1242.79	1242.79
12	Pharmacy	268.13	2620.84	2.00	5241.67	2620.84
13	Physics and Biology	290.56	3153.91	2.00	6307.82	3153.91
14	IT	95.41	260.75	1.00	260.75	260.75
15	Environment	291.57	1710.36	2.00	3420.73	1710.36
16	Mosque	205.70	1997.15	1.00	1997.15	1997.15
17	Afghanistan Center	163.61	1564.81	2.00	3129.63	1564.81
18	Fine Art	315.74	2225.39	4.00	8901.57	2225.39
19	Computer Science	273.95	1353.17	4.00	5412.68	1353.17
20	Guest House	292.61	1401.16	4.00	5604.65	1401.16
21	Economics	523.81	4155.30	2.00	8310.59	4155.30
22	Statistics Center	123.23	729.08	3.00	2187.23	729.08
23	Language	858.75	5742.85	2.00	11485.69	5742.85
24	Engineering	699.82	6870.55	1.00	6870.55	6870.55
25	Agriculture	505.37	3491.64	1.00	3491.64	3491.64
26	Library	363.83	4845.64	2.00	9691.28	4845.64
27	Research Center	112.78	551.37	2.00	1102.74	551.37
28	Chancellor Office	187.88	1770.58	1.00	1770.58	1770.58
29	Chemistry	237.11	3486.68	2.00	6973.36	3486.68
30	Teaching Complex	457.28	9150.92	4.00	36603.69	9150.92
31	Girls' Dormitory	736.83	6784.14	3.00	20352.42	6784.14
32	Construction Service	111.16	749.50	1.00	749.50	749.50
33	Social Science	234.16	1801.35	3.00	5404.06	1801.35
34	Transportation	120.11	850.48	1.00	850.48	850.48
35	Professor Affairs	142.95	761.33	1.00	761.33	761.33
36	Publishing	79.60	355.65	1.00	355.65	355.65
37	Publishing	68.57	163.41	1.00	163.41	163.41
38	Finance	56.97	202.45	1.00	202.45	202.45
39	Post Graduates	137.68	727.21	1.00	727.21	727.21
40	Public Policy	300.94	1478.80	4.00	5915.18	1478.80
41	Clinic	164.22	1243.85	1.00	1243.85	1243.85
42	Boys' Dormitory	74.16	343.17	3.00	1029.50	343.17
43	Boys' Dormitory	1497.71	11959.94	3.00	35879.83	11959.94
44	High School	101.01	423.51	2.00	847.02	423.51
45	High School	99.02	430.09	2.00	860.19	430.09
46	High School	132.62	752.14	2.00	1504.28	752.14
47	High School	103.79	477.31	2.00	954.62	477.31
48	High School	103.98	489.67	2.00	979.35	489.67
49	Recruitment	252.54	1468.25	1.00	1468.25	1468.25
50	Kindergarten	76.03	296.38	1.00	296.38	296.38
51	Statistics	64.47	254.88	3.00	764.64	254.88
52	NKB Bank	84.35	352.20	1.00	352.20	352.20
53	Electricity Station	54.02	115.40	1.00	115.40	115.40
	Total Area				**241585.909**	

Appendix D

Organizational Life Cycle of Kabul University Data

Category	Inventory flows	Indicators	Units	Data
Energy supply	Electricity	Hydro Power	kwh	20009736 72035050 MJ
		Fuel	kwh	65 kwh / per M 780 Kw/year Total 20010516 kwh /y
	Heat	Natural Gas	Kg	124596 kg 6229800 MJ 1730500 kwh
	Fuels	Diesel	L	100000L 3590000 MJ 84000kg
		Petrol	L	20000 L 500000 MJ 15800 Kg
Infrastructure	Office furnishings	Tables Office chairs Students Chairs Hall chairs	Amount Amount Amount Amount	500 500 2500 2688
	IT equipment	Office Laptops Office Computers LCD Screens Projectors	Amount Amount Amount Amount	100 350 218 141
Operating materials	Water from Water Supply system		m^3	39942885.6 kg 75506400 l 75506,4m3
	Stationary		USD	250373
Transport	Commuting of employees	Employers transportation	Kmp	30,000 km per month 360,000 km per years 296.5 pkm
	Commuting of students	Students Transportation	Kmp	4,500 km km per month 54,000 km per years Total with employee
Waste	Urban waste		Kg Kg	130 Tone/month 1560 Tone / Years
Other	Population Land Area Building Area		persons M2 M2	24,666 23,320.3 13,320.3

BIODATA OF STUDENT

Wafaurahman Wafa was born on 16th December 1979 in Nangarhar, Afghanistan, He graduated from Rahman Baba High School in Peshawar Pakistan. After passing the Kankor Exam (a Nationwide Test for University Entrance in Afghanistan), he joined the Faculty of Education at the Nangarhar University in 2004. Afterward, as a junior teaching assistant, he joined the Department of Environmental Protection and Disaster Management at the Faculty of Geosciences at Kabul University in 2010. After passing a competitive exam in 2012, he earned the Master of Science Scholarship (M.Sc.) from the higher education program (HEDP) World Bank in the Ministry of Higher Education Afghanistan. He was accepted by the Universiti Kebangsaan Malaysia (UKM) in the Faculty of Science and Technology. After completing his M.Sc. degree in the program of Environmental Impact Assessment and Monitoring, he returned to Afghanistan and rejoined the Kabul University as a lecturer in the Department of Environmental Science at the Faculty of Environment in July 2014. In September 2019, he enrolled in a Ph.D. program in Environmental Education and Ethics at the Faculty of Forestry and Environment, Universiti Putra Malaysia (UPM) with a scholarship from the Higher Education Development Program, Ministry of Higher Education Afghanistan project of the World Bank (HEDP, MoHE). However, on August 15th, 2021, the World Bank withdrew their all projects from Afghanistan, and he continued his Ph.D. program by self-finance.

LIST OF PUBLICATIONS

Wafa, W., Sharaai, A. H., Matthew, N. K., Ho, S. A. J., & Akhundzada, N. A. (2022). Organizational Life Cycle Sustainability Assessment (OLCSA) for a Higher Education Institution as an Organization: A Systematic Review and Bibliometric Analysis. Sustainability 2022, Vol. 14, Page 2616, 14(5), 2616. https://doi.org/10.3390/SU14052616

Wafa, W., Sharaai, A. H., & Koshy, N. (2024). Consideration of Financial and Environmental Concerns in the Life Cycle Costing of Higher Education's Facilities and Services: A Systematic Review of One Decade. International Journal of Academic Research in Economics and Management Sciences, 13(4), 532–556. https://doi.org/http://dx.doi.org/10.6007/IJAREMS/v13-i4/23705

Wafa, urahman, Sharaai, A. H., Matthew, N. K., & Akhundzada, N. A. (2025). Calculation of Higher Education Institution's Facilities and Services Applying the Life Cycle Costing Approach Contributing Sustainability. Journal of Sustainability Research, 7(1), e250016. https://doi.org/10.20900/jsr20250016