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Challenging Factors for Effective Governance of Higher Education towards Sustainable Development

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Abstract

Sustainable development requires a holistic approach involving social, economic, and environmental factors. The interaction between education and government is crucial, providing necessary knowledge and structures for sustainable practices and informed decision-making. This paper explored the relationship and challenges between governance and education, highlighting the importance of inclusive governance in prioritizing environmental literacy, social equity, and economic resilience in Bangladesh. This study focused on the mixed method approach. Primary and secondary data were collected for the study. Qualitative method was conducted In-depth interview and Key Informants Interview. Also quantitative method was utilized by survey method using kobo toolbox. Selected public universities are used as sample using purposive sampling. The study highlighted the academic and institutional challenges, political and environmental factors that hinders the proper application of governance in higher education. Besides, accountability and transparency mechanisms and practices were identified in the study. The analysis emphasized the significance of international cooperation, interdisciplinary curricula, and participatory governance in achieving the Sustainable Development Goals. The recommendations can be used by concerned authorities for improving the circumstances.

Keywords: Quality education, Higher Education, Effective Governance, Sustainable Development, Bangladesh.

Introduction

Without a strong education, a country cannot flourish. Naheed & Mohsin (2018) related education to a nation's backbone, although strong tertiary education is the backbone of education (Uddin, 2015). Bangladesh falls behind South Asian nations in higher education quality. The problems of guaranteeing excellent higher

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education are global ones. The government prioritizes high-quality, universal education (Sarkar et al., 2016). Acceptable education creates an informed, competent, adept, and efficient workforce to advance a nation's social, political, cultural, economic, and historical growth (Alawattegam, 2020). Graduates, administrators, and the community worry more about higher education quality. Bhuiyan et al. (2004); Amin & Sheikh (2021) said that degree-granting Bangladeshi universities; usually, universities know higher education. Modern society requires research- based higher education. Higher education quality improves a nation's economy, society, and education (Hossain, 2017). The quality of postsecondary education is complex (Harvey and Green, 1993, cited in Hasan & Hosen, 2022). Higher education is more competitive. According to Islam et al. (2017), and UNESCO (2005), pointed out that a country's higher education program's integrity, evaluation, and monitoring impact its international position and socio-economic stability. Society holds institutions accountable for graduates (Rabbani & Chowdhury, 2014). The government ensures top-notch education. Every segment of society realised the need for a skilled workforce to promote self-sustaining growth and reduce poverty, according to (Monem & Baniamin, 2010). Also, competent and knowledgeable personnel may increase the economy (Bhuiyan et al., 2009). Bangladesh is underutilizing its huge people resource owing to a lack of education and skills. Importantly, Khan et al. (2014) found that Bangladesh's educational system lacks confidence in establishing a national body of knowledge, which boosts human capital and development. Besides, intellectual property stresses competent, experienced, educated, and skilled individuals.

Moreover, qualified professionals who can integrate human, livelihood, and community improvement with local and global organisation demands (Bhuiyan et al., 2009). According to Hasan & Hosen (2022); Marzo & Navarro et al. (2005), investigated that several stakeholders are worried about the servile model in higher education. However, quality education involves planning and strategy (Hassan, 2020). Verifying higher education quality permits current curriculum implementation and black-and-white Bangladeshi education (Mukul et al., 2013). To promote informal knowledge, higher education institutions give financial aid, coaching, monitoring, and logistics supports, according to Schendel & Mccowan (2016). Political involvement and education quality concerns are best increased by nursing leadership in higher education (Naheed & Mohsin, 2018). Bangladesh's educational concerns include religion and moral values (Roy et al., 2020). Regretly, Rabbani & Chowdhury (2014) found that high-achieving students typically lack communication skills, curricular knowledge, cross-disciplinary understanding, and learning area leadership.

Rashid and Rahman (2017), cited in Ullah (2020), claimed that additional universities, professors, and students would not enhance education rather than higher education has infrastructure issues, unplanned construction processes, library restrictions, outdated laboratories, limited research facilities, funding restraints, and misaligned academic calendars. Including to, current skills shortage is due to obsolete educational system, where academic institutions, administration, and research institutions did not examine market demands to discover capabilities (Khan, 2019). In Hasan & Hosen (2022), Carvalho & Mota (2010) and DeShields, Kara, & Kaynak (2005) found that colleges compete to teach students. Quality control has improved education, research, and community service in underdeveloped countries (Lim, 1999, referenced in Hasan & Hosen, 2022). Successful quality control will benefit developing nations. In the digital era, teachers, guides, and researchers can impact education, but not quality ensured (Wani & Kumar, 2019). They are creating a safe environment to boost education, generate and deploy effective educational practices to meet quality requirements and produce responsible education quality supervision (BSS, 2017). A trained workforce may help a country grow (Hosen & Shamim, 2019). Higher education in Bangladesh is struggling due to economic issues and the world doesn't respect Bangladesh's higher education properly (Hossain, 2017).

Khan et al. (2014) cited in Olssen & Peters (2005), who concluded that high-quality education for everybody enhances intellectual resources, innovation, and the knowledge- based economy. Globalising and institutionalising education is necessary to provide economic-boosting human resources (Omede, 2015). Global elite educational institutions should collaborate on analytics to improve education (Crossman, 2021). Financial challenges, university quality management, and public institution product testing issues (Monem, 2007 referenced in Rabbani & Chowdhury, 2014). For HEIs to achieve sustainability, effective governance, stakeholder cooperation, and communication were shown to be essential (Hinduja et al., 2023).

The foregoing barriers to education worried academics, practitioners, and researchers worldwide about tertiary education's future. Public Universities have done minimal study on higher education problems and their effects in Bangladesh, despite their importance. Unplanned infrastructure, inadequate learning, insufficient library facilities, budgetary restrictions, and unfavourable research settings are impediments (Schendel & Mccowan, 2016). Additionally, various studies have examined higher education concerns, issues, and practises, but their various flaws mean they have not fully described the reality. However, this research examines all

aspects of promoting excellent education and its problems in the specified location, specifically Dhaka, Chittagong, Rajshahi, Jahangirnagar, Jagannath, Barishal, and Comilla University's evaluation. This research covers academic, political, administrative, governance, and environmental challenges from the mentioned University's standpoint. It is crucial to analyze if all pubic universities' higher education providers are providing adequate education to disclose the true picture.

The specific objectives of the research are to 1) to identify the academic and institutional challenges of higher level education; 2) to investigate the impacts of political and administrative decision on higher education; 3) to find out the environmental effects on the governance of higher education; and 4) to examine the mechanism of accountability and transparency of higher education. The findings provide academics, practitioners, and field researchers many ways to better comprehend the national process.

Literature Review

These are the top studies on this topic. A study indicated that faculty teaching skills affect student knowledge-sharing dissatisfaction (Islam, 2019). Quality faculty recruitment is essential (Rabbani&Chowdhury,2014). Sarbabidya & Rashid(2018)found public university courses lacking in national and international norms. Higher education institutions prioritise profit over education (Naheed, 2018). Islam (2019) reported that fourth-course lecturers are late and unable to complete coursework. Another research found that lack of lab access, journals, papers, books, electronics, and logistics help hinder outstanding teaching (Bhuiyan et al., 2009). Dissatisfaction with the examination system and government education policy, curriculum content assessment compared to world-wide norms, and departmental student excellent education (Naheed, 2018). Higher education research is at an all-time low (Baig, 2020). The study indicated that most pupils originate from disadvantaged homes, which are environmental challenges (Islam, 2019).

The lowest GDP share in South Asia is 2% in education (Ehsan,2021). Haqueetal (2011) identified no institutional logistics, internet, or smart classrooms. Research found that lack of residential seats, traditional knowledge exchange techniques, technical and applied-based curriculum, political students and instructors, low classroom capacity, and delayed test processes produce session congestion and economic restrictions (Islam, 2019). Karman et al. (2010), reported in Sarbabidya & Rashid (2018), showed that some tests may assist instructors in enhancing their interpersonal skills, honesty, adaptation to student behaviour, continual contact with participants, and name-calling.

According to Varghese (2004), Rabbani & Chowdhury (2014), university employees are primarily active in politics, commerce, and business. Zar et al. (2013) identified library shortages of key books, magazines, periodicals, and journals. Classroom environment, teacher- student interaction, and seating configuration might hamper learning (Islam, 2019). Complex administration, limited teacher preparation, and lack of instructional technology affect disabled students (Omede, 2015). To strengthen education, Sri Lanka needs more international expert discussions (Event, 2021). Faculty may learn new teaching topics and methods via research (Bhuiyanetal., 2009). Most students cannot express their thoughts in class (Islam, 2019). Insufficient student feedback, teachers unwilling and unable to use technology, poor training design and learning materials, unclear lectures, inadequate vision, mission, and objectives, and institutional and technical encouragement for critical thinking, management skills, research, new facts, and accountability (Islam, 2019).

South Africa has low government funding, research possibilities, equal access, institutional and infrastructure development, and better academic standards (Moloi & Motaung, 2014). He also observed that demand analysis and frequent syllabu srevisions based on recommendations need a contemporary instructional and administrative facility with adequate capacity, a dining hall, and auditorium with digital equipment, capstone rooms, and a cafeteria (Islam et al., 2017). Islam et al. (2017) found that there is no institutional framework to implement leadership, national plans, policies, and framework are opposite the university vision and mission, there is no purposive linkage with university objectives of department programme objectives, and teacher promotion measurement is unsatisfactory. Hossain (2017) found the internal strategic plan weak. Faculty, administrative, and other staff recruitment and evaluation are difficult (Islam et al., 2017). Staff training needed due to resource shortages, inexperienced workers, and defective intra and inter-management procedures (Manyaga, 2008). Ekwueme (2003) observed that Nigerian higher education is difficult due to bad administration, insufficient technology resources, poor library facilities, and a government that doesn't promote excellent education.

Lack of knowledge, co-curricular activities, creative, practical, technical, and technology- based learning methods, insufficient physical settings, obsolete teaching methodologies, packed classrooms, and regional, gender, and socio-economic (Baig, 2020). Aleixo et al. (2018) found that implementing sustainable practices is thought to be significantly hampered by declining student enrollment and declining financing for higher education. He also added the development of

sustainability efforts is hampered by this financial limitation, which causes a dependency on spending resources. Ehsan (2021) identified a gap between market needs and graduate capabilities, no critical thinking, case analysis, problem solution, or theoretical understanding of application. He also identified politically biased, dishonest recruiting and little previous training or experience for new fellows. Hasan & Hosen (2022) rank administration, technical help, bookstore and laboratory equipment, globalisation, and dormitory facilities below baseline. The lack of a national regulatory structure demotivates education (Alawattegam, 2020). Most Rajshahi University departments lack internet and computer laboratories (Rabbani & Chowdhury, 2014).

According to Evans (2000), cited in Eleweke & Rodda (2002), pupils globally face educational issues. External politics affect public tertiary institutions (Hossain, 2014). According to Rahman et al. (2019), inclusive learning research and development needs greater financing. Teachers, students, authorities, politicians, and decision-makers may impact higher education (Teichler, 1999). Alam et al. (2023) highlighted how crucial it is to close the digital gap in order to promote inclusive, digitalized higher education, which is necessary to create people who are proficient with technology and guarantee a sustainable society in the future. Pakistani educational institutions have launched a number of projects, such as seminars, speeches, and debates centered on the Sustainable Development Goals (SDGs). This suggests that higher education is becoming more conscious of and dedicated to sustainability (Hinduja et al., 2023). Many Nepalese higher education institutions' leaders, instructors, and students are unaware of the Sustainable Development Goals (SDGs); this lack of knowledge makes it more difficult for these institutions to adequately prepare for Higher Education for Sustainable Development (HESD) and to solve social, economic, and environmental issues (Adhikari & Shrestha, 2023). The findings highlight how crucial it is to involve important parties, such as governmental and corporate entities, in order to promote a cooperative strategy for enhancing HEI infrastructure (Ebekozien et al., 2023). Islam (2025) resulted that the accomplishment of the SDGs is significantly aided by both social and economic considerations.

Kalbuana & Indra Cahyadi (2024) highlighted the difficulties in putting changes into practice in the field of higher education. Significant obstacles include things like budgetary limitations, bureaucratic complexity, and opposition to change. In addition to highlighting the necessity of incorporating technology into sustainability practices in higher education, the study underscores how technology may improve Education for Sustainable Development (ESD) (Shishakly et al.,

2024). By encouraging a variety of viewpoints and improving project results, the study highlights the value of multidisciplinary project teams that comprise university employees, students, and industry professionals in advancing sustainable development (Podgórska & Zdonek, 2024). The study revealed important issues that kids face, namely a lack of knowledge about sustainability among their families. Their capacity to participate in sustainability activities successfully may be hampered by this ignorance (Mader et al., 2013). Hassan Sain et al. (2024) revealed progress towards the SDGs is hampered in many nations by socioeconomic and political issues, highlighting the necessity of efficient governance, communication, and cooperation within institutions to support sustainable practices. Mahmud (2017) found that a compartmentalized educational system, bureaucratic conflicts, a perceived lack of sustainability awareness among lecturers, differing degrees of sustainability acceptance influenced by academic disciplines, a lack of teaching skills among ESD educators, and limited financial support from the university.

Many experts and researchers have researched higher education difficulties in Bangladesh, Africa, and South Asia. Due to poor knowledge-sharing methods relevant to the physical setting ,institutional support and capacity, scarcity of resources, skills and knowledge gaps, poor research, and other internal and external environmental factors as a subcontinent, Bangladeshi researchers focus on higher education research.

Theoretical Framework

Good Governance Framework by UNDP an all-encompassing strategy for effective governance that takes into account social, political, economic, and environmental factors. In order to guarantee that a government functions justly and meets the needs of its constituents with the least amount of corruption and abuse of power, good governance theories and principles typically include concepts like accountability, transparency, participation, responsiveness, rule of law, equity, efficiency, effectiveness, and the protection of human rights.

Dependent Variable	Independent Variable
Effective Governance of Higher Education	Accountability and Transparency
	Effectiveness
	Political and Environmental Factors

Fig.1. List of Variables

Challenging Factors

Main theme	Sub-themes
Effective Governance of Higher Education towards Sustainable Development	Academic Challenges
	Institutional Challenges
	Political Influence
	Administrative Governance and Efficiency
	Economic Constraints and Financial Governance
	Environmental Factors
Ways out	Role of Government, Institution, Faculty Members and Students

Fig.2. List of themes and sub-themes.

Methodology

This qualitative and quantitative exploratory research examined the problems of effective governance of higher education and its quality for ensuring sustainable development. The inductive research design included a survey questionnaire for quantitative study that was used as open-ended and close-ended questionnaire using Kobo toolbox and also in-depth interview and key informants interview were conducted for qualitative data. Fieldwork is the most popular approach for gathering primary data in empirical investigations, to evaluate and suggest particular evidence and facts (Adhikari, 2011 referenced in Al-Amin, 2022). The structured questionnaire with 46 items, 33 of which evaluated students' perceptions of higher education's quality education challenges on a five-point Likert scale (1= very poor, 5= very good) administered online via Messenger and WhatsApp. Based on respondent choices, interviews lasted 45-60 minutes. Interview transcripts were verbatim translated into English. The secondary data from journals, articles, books, newspapers, and research reports. Operating research relies on primary data (Haque et al., 2011). The critical secondary data literature research establishes a conceptual framework (Rahman et al., 2022). The research examined how respondents explained situations through interpretation. The study area is specifically Dhaka, Chittagong, Jahangirnagar, Jagannath, Rajshahi, Barishal, and Comill Universities affiliated with the University Grant Commission (UGC). The researcher must design the sample to reflect the population (Haque et al., 2011). This research used purposive sampling to identify themes, categorise, and apply grounded theory. Where surveys (N=380) respondents and interviews (N=40) respondents were

collected. To understand the questions, replies, and main issues, researchers recorded and examined each transcript recording many times to investigate, classify, sort, modify, customise, and show. Inductive thematic analysis started with codes and then developed groupings and sub-themes. After collecting data from respondents, SPSS Statistics (26.0) was used for frequency analysis, and MS Excel for graphical summary with in-text analysis.

Result

This section of the paper presents some primary information about the different Public university students of Bangladesh. Table 1 illustrates the outputs of the questions related to gender, department, major discipline (faculty), stage of education, and year of education. All the data presented here is based on primary data.

Table 1. Demographic profile of the selected respondents

		Gender	Faculty	Department	Stage of Education	Year of Education
N	**Valid**	380	380	380	380	380
	Missing	0	0	0	0	0
Mean		1.4556	4.1667	9.9444	1.1444	2.0333
Median		1.0000	4.5000	11.0000	1.0000	1.0000
Mode		1.00	3.00	11.00	1.00	1.00
Std. Deviation		.50081	1.32606	4.84910	.35351	1.19409

Variable	Categories	Frequency	Percentage
Gender	Male	190	50
	Female	190	50
Faculty	Law	50	13.16
	Arts & Humanities	50	13.16
	Social Science	50	13.16
	Engineering	50	13.16
	Business Studies	50	13.16
	Science	50	13.1
	Other	80	21.05

Table 1 presents the personal and demographic information profiles of the respondents, classified by gender, major discipline (faculty), and stage of education. The mentioned Table stated that the sample respondents of males and females were (50%). This scenario demonstrated that the ratio of male and female students participating in the survey was equal. On the other hand, the respondents belonging to the faculty "Law" are 50 respondents, which is 13.16% of the total respondents, 13.16% belong to "Arts and Humanities", and 50 respondents represent "Social Science". Similarly, 'Engineering, Business Studies, and Science' each accounts for 13.16% of the total respondents, with 50 participants sharing their opinions. Finally, among 380 respondents, the highest mark is obtained by those belonging to 'others' faculties (21.5%).

Table 2-5, reveals that under the question of institutional settings, 86.7% of students said 'Yes' and 13.3% said 'No' in terms of the multi-media classroom they have. Table 2 shows that in terms of 'seminar room and auditorium availability' 67.8% and 40.5% of respondents said 'Yes' and 'No' (32.2%), (59.5%) respectively. Also, 30.9%, 60.2%, 60%, 50% belonging to gymnasium, medical facilities, exam hall facilities, common/prayer room said 'Yes' and on the other hand students said 'No' remaining of the percent of the data. The quality of common/prayer room is very poor (30%), poor (20%), average (40%), and good (10%). In the case of 'cafeteria facilities, residential setting, recreational facilities, reading room quality, wi-fi facilities' respondents said good (15%, 5%, 10%), average belonging to 25%, 20%, 38%, and 27%, poor (25%, 26%, 22%, 28%, 30%), very poor belonging to 35%, 49%, 38%, 24%, and 34% said by students. Under the question of academic challenges, respondents opinioned on teaching method, outcome based. curriculum, library facilities, exam hall facilities, lab facilities which were 25%, 50%, 10%, and 20% indicates (very poor), 35%, 30%, 13%, 20% indicates (poor), 30%, 10%, 37%, 45% belongs to (average), and 10%, 30%, and 15% belongs to (good) of the services. The highest positive response was the international standard method, followed by universities 71.2% said 'Yes', session jam, which is the second highest, followed by the conducting class regularly by faculties, and the lowest score for hygiene and sanitation was 13% but in the case of the research scope, students responded negatively, 'No' (50%). The situation of environmental factors with the highest response is 'average', followed by 'poor', 'very poor', and minimal facilities are provided by institutions, considering the internal and external environment, which is 'good' in terms of security, quality of food, competition, part-time job, skills development, and student counseling. Most of the respondents believed that teachers' and students' affiliation with politics hampers an academically sound

environment, as displayed in Table 2. Under the political factors, on one hand, the number of drug-addicted (53%) students is increasing, whereas the ragging system (33%) is declining day by day on campus. The final theme, financial support, most of the respondents said 93% (No), belonging to the research fund for students' innovation, which is less than the merit scholarship given to students, who said 'Yes' (47%) of the total respondents.

Table 2: Academic Challenges

Sub-Theme	Qualitative Insight	Numeric Support
Curriculum Rigidities & Assessment Issues	Outdated, inflexible curriculum; exams not measuring competence	Exam Hall Facilities: 60 (60%) Yes, 40 (40%) No
Teaching Strategies	Traditional lectures; limited critical thinking	Teaching Method: 25 (Very Poor), 35 (Poor), 30 (Average), 10 (Good)
Research Opportunities	Limited funding and institutional support	Research Scope: 50 (50%) Yes, 50 (50%) No
Language Barriers	Difficulty understanding content in non-native language	No numeric item available

Academic Challenges

Curriculum Rigidities and Assessment Issues: Participants emphasized that students' ability to improve their skills is limited by out-of-date and inflexible curriculum that do not satisfy the expectations of the modern workforce. Many students believed that the exam and grading procedures did not adequately evaluate their overall knowledge and proficiency.

Teaching Strategies and Research Opportunities: Traditional lecture-based teaching strategies that do not promote critical thinking or the application of information in real-world situations have drawn criticism from both faculty and students. Limited innovation and knowledge development resulted from faculty and student reports of inadequate financing and support for academic research.

'Short-term training does not improve teaching abilities; that requires long-term course and department-based training.'

Language Barriers: Students found it challenging to understand course content and successfully communicate their thoughts in institutions when courses are taught in a non- native language.

Challenging Factors

Table 3: Institutional Challenges

Sub-Theme	Qualitative Insight	Numeric Support
Infrastructure Deficiencies	Poor labs, libraries, classrooms; weak digital resources	Multimedia Classroom: **330 (86.7%) Yes**, **50 (13.3%) No** Seminar Room: **257 (67.8%) Yes**, **123 (32.2%) No** Auditorium: **154 (40.5%) Yes**, **226 (59.5%) No** Wi-Fi: **34 (Very Poor)**, **30 (Poor)**, **27 (Average)**, **10 (Good)**
Administrative Inefficiencies	Slow decisions; strict rules; excessive paperwork	*No numeric item available*
Financial Constraints	High student costs; low faculty pay; limited research support	Merit Scholarship/Stipend: **47 (47%) Yes**, **53 (53%) No**
Student–Teacher Ratio	Overcrowded classes; teacher shortages	*No numeric item available*

Institutional Challenges

Infrastructural and Administration Deficiencies: Participants highlighted how the absence of contemporary labs, libraries, and classrooms hinders research and learning. Access to online study and research is hampered by the fact that many universities lack sufficient digital resources, despite technological developments. Academics and students identified inefficiencies in the administration of the institution, such as protracted decision-making processes, strict regulations, and excessive paperwork. While academic members get insufficient pay and support for research, many students struggle with tuition and other costs. The main issues influencing the effectiveness and growth of institutions were found to be inadequate policy implementation and a lack of autonomy for universities.

One respondent noted '*The current multi-media rooms are not education-friendly; they* lack *key equipment, and many sections of the system are broken, hindering dynamic class sessions.*'

Student-Teacher Ratio: Two of the biggest barriers to good instruction and individualized learning were identified as overcrowded classrooms and a shortage of teachers.

Table 4: Political & Administrative Challenges

Sub-Theme	Qualitative Insight	Numeric Support
Policy Instability	Frequent policy changes affecting curriculum, hiring, funding	*No numeric item available*
Political Influence	Favoritism in hiring; interference in student government	Teacher Politics: **7 (Good)**, **23 (Average)**, **20 (Poor)**, **50 (Very Poor)** Student Politics: **18 (Good)**, **21 (Average)**, **31 (Poor)**, **30 (Very Poor)**

Governance Inefficiencies	Lack of transparency; bureaucratic delays	*No numeric item available*
Academic Freedom & Autonomy	Political interference limiting institutional independence	*No numeric item available*
Socio-Cultural Dynamics	Social norms shaping curriculum and governance	*No numeric item available*
Digital Governance	Digitalization improving transparency but requiring investment	*No numeric item available*

Political and Administrative Challenges

Policy Development and Execution: Participants emphasized that administrative and political choices have a big influence on higher education policy. Respondents noted that changes in government often lead to modifications in educational policy, which in turn affect research funding, faculty hiring, and curriculum development. Several respondents expressed concerns about policy inconsistencies resulting from political changes, which threaten institutional stability and long-term academic planning.

Political Influence on Higher Education: The broad impact of politics on educational establishments was a recurrent issue. Numerous participants stated that when making decisions, political factors frequently take precedence over academic ones. Favoritism in teacher hiring, meddling in student government, and political nominations to important administration roles were noted as major obstacles. According to several respondents, excessive political meddling restricts academic independence and hinders promotion based on merit.

Administrative Governance and Efficiency: Although administrative inefficiencies were frequently mentioned as problems, effective governance is crucial for institutions of higher learning. Participants talked about lack of openness in decision-making, delays in implementing policies, and bureaucratic obstacles in allocating funds. Several academics and students emphasized that administrative decisions are often made without sufficient stakeholder involvement, leading to institutional inefficiencies and discontent.

Academic Freedom and Institutional Autonomy: Respondents emphasized the importance of academic institutions functioning independently of political influences, making institutional autonomy a major concern. Numerous respondents pointed out that political meddling restricts institutions' autonomy in determining their own agendas, which has an impact on academic independence and research

interests. Another significant barrier to institutional growth and innovation was identified as the absence of autonomy in financial management.

Socio-Cultural Dynamics and Institutional Autonomy: Social norms and cultural influences influence higher education governance, especially when it comes to institutional policies and curriculum creation. Decision-making is influenced by societal, academic, and student expectations. One participant revealed: "*Societal norms and cultural values often determine what can be taught and how universities function.*"

Developments in Technology and Digital Governance: Technology now plays a bigger part in the governance of higher education. Decision-making has changed as a result of the incorporation of digital technologies into research management, online education, and administrative procedures. One administrator said: "Digitalization has improved transparency, but it also requires significant investment and skilled personnel."

Table 5: Accountability & Transparency Challenges

Sub-Theme	Qualitative Insight	Numeric Support
Accountability Systems	Gap between policy and practice; weak enforcement	Drug Addiction: **53 (53%) Yes**, **47 (47%) No** Ragging: **33 (33%) Yes**, **67 (67%) No**
Transparency in Decision-Making	Limited access to financial and administrative information	Conducting Class Regularly: **61.1 (61.1%) Yes**, **39.9 (39.9%) No** International Standard: **71.2 (71.2%) Yes**, **28.8 (28.8%) No**

Accountability and Transparency Challenges:

Views of Stakeholders on Accountability: Participants, who included academics, administrators, students, and legislators, shared a range of opinions about accountability systems. The presence of official regulations and policies that specify institutional accountability was a recurrent subject. Many responders, however, pointed out a discrepancy between policy and reality, highlighting the difficulties in putting it into practice because of ineffective bureaucracy and lax enforcement.

Openness in the Processes of Making Decisions: The majority of institutions have transparency rules, but how they are implemented differs, according to the report. Participants emphasized how crucial it is to communicate clearly when it comes to curriculum design, faculty hiring, and funding allocation. There is a need for more public openness, since several respondents expressed discontent with the restricted access of financial records and administrative decisions.

Discussion

After analyzing the facts, it is regrettable that after fifty years of independence, education quality is not improving despite the government's laws, policies, programmes, and activities. Due to a lack of resources, most students are unable to expand their education border, develop their analytical and critical thinking abilities, and become competent human resources for society and state. According to the findings, substantial policy reforms are necessary to address the complex academic and institutional issues that higher education institutions face. To overcome these obstacles, we must move toward adaptable curriculum, creative teaching strategies, more financing for research, and effective governance frameworks. Enhancements to infrastructure and the accessibility of digital resources are also essential for creating an atmosphere that supports higher education. Competition requires creativity, innovation, and problem-solving.

Academicians, guides, and stakeholders face constraints of resources, institutional supports, materials, environmental factors and knowledge, practises, poor research scope and lack of unplanned infrastructure, unskilled manpower for decision making, ineffective teacher training, and lack of quality education for ensuring international standard method in public university's learning system. The apparently greater education in this study arena doesn't show this. The qualitative analysis revealed that while policies on accountability and transparency exist, their effectiveness depends on enforcement, institutional culture, and stakeholder involvement. Top education requires administrative support, auxiliary services, lab and library resources, globalisation, and accommodation (Hasan & Hosen, 2022). Libraries organise materials and databases, and the Internet is a major source of information (Rabbani & Chowdhury, 2014). Analysis finds inadequate books, journals, and other resources, including difficult access to e-books. Students have unreliable internet and programme assessment follows the vision. The curriculum is unsuitable for work. Higher education may boost the economy. Currently, a curriculum is a priority (Topader, 2019 referenced in Ehsan, 2021).

Internal and external issues with poor housing hinder further education. Adaptable infrastructure motivates students, but it must be designable and appropriate for a canteen (Ullah, 2020). The lack of modern instruction, lobbying in recruiting, and bureaucratic behaviour are hurdles. Medical care is essential, but medical facilities are substandard. Unsupervised sanitation and the absence of a common space make women feel unsafe. Includes teaching and knowledge-sharing-friendly classrooms with enough internet and multimedia room (Musa, 2020).

However, misguiding, abuse of politics, misallocation of resources, lack of transparency and institutional control mechanisms, poor quality control, limited scope, and reluctance to research are challenges for higher education.

Conclusion and Recommendations

After discussing the following findings, instructional techniques and learning environments are unadoptable, hurting education status. Students' comfort in infrastructure and housing needs improvement. In addition, research restrictions impede the investigation. The external environment also affects student learning. Institutional administrators, educators, and legislators must work together to address these issues. Future studies might examine viable fixes and industry best practices for raising the caliber of universities. However, institutional and financial assistance are adequate to make students comfortable. Other difficulties that library and medical services cannot address. To enhance education and meet all quality education needs, the government must provide enough funds. Higher education also needs strong communication, leadership, teaching methods, and other assistance. The overall development of plans, policies, arrangements, research and infrastructure improvement, and integrated framework ensures excellent higher education in Bangladesh. Bangladesh aims to achieve SDGs by 2030. Since excellent education is one of the SDGs, the government takes drastic efforts to change education patterns and improve its quality. Due to political instability, lack of quality education, corruption, and high illiteracy, the country has not made significant progress in education and research despite its middle-income status (Hossain et al., 2019). Bangladesh's education system is poor due to infrastructure issues, inadequate studies, fair atmosphere accessibility, unrestricted political activism, lack of professional practise, insufficient rational training, mismanagement of course outlines, shortage of lab and library facilities, and inadequate books and materials for references, as well as weak institutional mechanisms (Mukul et al., 2013). However, there is no adequate structure, norms, or review method against policy execution. Due to a lack of job market abilities, pupils do not acquire desired placement (The Financial Express, 2019, referenced in Ehsan, 2021). Finally, higher education should be quantifiable, reasonable, attainable, and sustainable, not a phrase. The study presents following recommendations:

- To improve lecturing abilities, build the University Teacher Training Centre (UTTC) as a sister institution of IQAC to offer the Foundation Training Course (FTC) for new and experienced academics.

- Remove political misuse and unlawful tendencies, while improving political culture among senior and younger students.
- Enhance campus extracurricular activities and part-time work opportunities to enhance soft skills and Subsidize the cafeteria and dining hall to promote healthful and high-quality cuisine.
- Ensure 24/7 medical services, equipped with contemporary technology, and give logistic support for improved treatments. And The universities should establish internal accountability, collaboration, and an active external authority (UGC) that reports yearly using actual data.

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Effectiveness of Banning Plastic Bags in Urban Areas of Bangladesh: A Study on Dhaka City

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Abstract

Plastic bags' availability and frequent usage in urban areas have become significant environmental challenges due to their non-biodegradability impact, especially in densely populated cities like Dhaka. Bangladesh notified a nationwide ban on plastic bags in 2002. However, surprisingly, the increase in the use of plastic bags remains high, which hampers the ban's effectiveness. The study's primary purpose is to evaluate the effectiveness of banning plastic bags in Dhaka City, Bangladesh. This study conducted a mixed research method, including qualitative and quantitative analysis. For qualitative analysis, it utilized Semi-Structured Interviews to understand the overall effectiveness of this policy. For quantitative analysis, it conducted a survey questionnaire among 450 households. The study used the Statistical Package for Social Sciences (SPSS), version 25, to analyze data through descriptive statistics and a chi-square test. The residents of North City Corporation use 17 plastic bags on average in a week. Most of the people are aware of the banning decision through electronic media (18.2%), newspapers (13.6%), and community people (7.6%). The result also shows that plastic bags are commonly used in households, mainly for grocery shopping (33.3%) and food packaging (13.6%). The chi-square test reveals that there is a statistically significant association between educational qualification and people's stance on the prohibition (P- value <0.05) as well and the study also reveals that there is a significant influence of occupation on the frequency of plastic bag use (p-value < 0.05). This study also conducts a correlation between two continuous variables. However, alternatives like jute and cloth bags have

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become increasingly popular, frequently supplied by shops or bought independently by consumers. The challenges to the effectiveness of the ban on plastic bags include the affordability of alternative bags, the inconvenience of carrying them while shopping, and the failure of local businesses to comply with the ban. The study recommends taking measures to increase public awareness and reduce the cost of alternatives. Also, the government should emphasize imposing penalties to ensure implementing the plastic bag banning decision in Dhaka effectively.

Keywords: Ban, Plastic Bag, Urban Area, Dhaka City.

Introduction

Plastic bags became famous after its introduction in 1970's among the dealers and consumers. According to some studies, People use 500 billion plastic bags all over the world (Shawon et al., 2023). Plastic is made up by a harmful chemical named synthetic organic polymers. Nowadays plastics are used for variety purposes including garment manufacturing, medicinal applications, food preservation and packaging, electrical device suppliers, construction, and so on. People are producing and disposing of a large amount of plastic which is creating environment, water and soil pollution. Plastic bags are disposed of openly in any site, such as a roadside, park, or land, poses a risk to human health and the environment by causing soil pollution. Using plastic has emerged as a major environmental challenge for Bangladesh also. Dhaka, the Capital of Bangladesh, is facing difficulties due to the excessive use of plastic and facing challenges like ecological and infrastructure problems, clogged drainage during flood, loss of river and aquatic animals as well as affecting human health and biodiversity. European Union nations as well as the majority of Asian and African countries implemented a plastic bag tax policy to address this issue. Bangladesh, India, Taiwan and China are the initiator countries in Asia Continent to promote the banning policy of plastic. (Muposhi et al., 2021). Despite the regulatory system of using plastic, the use of plastic increased vigorously and now it has become an alarming situation for the country especially the urban areas like Dhaka city. It also raises concern about the effectiveness of banning policy and authorization of government initiative. Dhaka city produces a significant amount of plastic waste from daily household activists to industrial wastes. Plastic bag is a non-biodegradable chemicals which takes 100 years to decompose into the soil and it becomes an environment hazard and also the reason behind soil pollution. (Amir-ud-Din et al., 2024). Besides, cheapness, light weight, and

being easily accessible, are also the reasons for using plastic bags (Shawon et al., 2023). Dhaka North City Corporation area consists of 54 wards which covers half of Dhaka with a huge number of people living here. Now, the new interim government of Bangladesh takes initiatives again to ban the plastic use both for the retails and consumer for using on daily purpose. They are taking measures and strict prohibition for retailers and super shops not to provide plastic for carrying goods and also raising awareness among the general public to stop reusing plastic. Moreover, they are improving the waste management system for recycling and disposing of the plastic properly.

Literature Review

Plastic bags are being used frequently throughout the world because of its availability and as it is easy to carry for being light weighted. Though plastics has adverse environmental and health impacts, still it is being used based on its widespread popularity. Waste management of plastic usage has become a major environmental and social issue worldwide, particularly in Bangladesh (Abedin, 2024). The global mismanagement rate is 22%, whereas the recycling rate for plastic waste is 9%, which is lower. Six hundred forty-six metric tons of plastic waste are collected daily in Bangladesh, however only 10% of that material is recycled, and the remaining 37.2% need to be properly disposed of (Abedin, 2024). Bangladesh implemented a statewide ban on plastic bags in 2002 as a defensive move to protect the environment and ecosystems. Bangladesh was the first country to prohibit plastic bags in 2002, highlighting considerable environmental degradation and drainage obstructions caused by polythene waste (Hossain,2012). According to Sinha (2014), plastic pollution in metropolitan and urban areas causes waterlogging and affects natural water flow. Rahman and Alam (2016) contend that, despite the ban, ineffective implementation and a lack of awareness among the people have hampered its success. Uddin et al. (2018) discovered that plastic trash substantially pollutes soil and aquatic environments, endangering biodiversity. Furthermore, Islam and Mia (2020) emphasized the necessity of long-term alternatives and stronger policy implementation in reducing plastic dependency in Bangladesh. The authority's ability to carry out the ban is insignificant, which also increases the possibility of the plastic bag ban (Ifthear Hossen Shawon, 2022). Retailers agree that the absence of an alternative is the reason for violating the plastic bag banning prohibition (Ifthear Hossen Shawon, 2022). According to the logistic regression results,

the frequency of raids by public authorities, the lack of availability of alternative products, a lack of knowledge about the adverse impact of plastic bags on ecosystems and the environment, and a business license all have a significant influence on retailers' compliance with the enforcement of banning plastic bags, whereas the proximity of the shop to the main road allows for noncompliance (Ifthear Hossen Shawon, 2022). The authors advocate for the easy availability of alternatives, as well as increased public awareness of the need of environmental conservation and ecosystem restoration through the successful implementation of ban.

At the same time, several other scholars emphasized the importance of strengthening government laws and roles to enhance the effectiveness of the prohibition. In our county, the majority of old plastic products are thrown away after their first use, and due to poor management, they end up on roads, in drains, canals, rivers, and in roadside open dumps. A research undertaken by garbage Concern, a Bangladeshi social business venture that promotes resource recovery from garbage, concluded that approximately. Principal Types of Plastic Materials Found in Discarded Waste Plastic Types Use HDPE trash bags, milk bottles, shopping bags. LDPE Bags, food wrap, and plastic films PVC Bottles, packing, containers, plumbing and sewage lines, floor and furniture covers. PET beverage bottles and containers (Hossain1, Md, Chowdhury1, & Mohonta2, 2021). PS Hot beverage cups, thermally insulated take-home boxes, food containers, such as trays for holding meat and eggs, and insulating materials. PP Yogurt containers, diapers, straws, wrapping paper, butter tubs, and special bags. In Bangladesh, 0.8 million tons of plastic garbage are generated per year, with 36% recycled, 39% landfilled, and the other 25% going uncontrolled and ending up in the marine environment. (Hossain1, Md, Chowdhury1, & Mohonta2, 2021). Although Bangladesh's ban on plastic bags was a groundbreaking environmental initiative, difficulties with enforcement and financial considerations have limited its efficacy. Long-term success depends on bolstering legal frameworks, raising public understanding, and encouraging sustainable alternatives. To reduce plastic pollution in Bangladesh, further investigation into creative fixes and efficient policy implementation are required.

Rahman et al. (2025) identify that harmful substances, such as plastic, contribute to plastic pollution, with the main causes including mismanagement of waste, overpopulation, poor disposal habits, and

excessive consumption of plastic, which affects not only biodiversity but also the health of human beings. People have a positive reaction to minimizing plastic pollution by reusing plastic bags, taking responsibility through conscious shopping, disposing of plastics correctly, and suggesting several programs, such as creating awareness and providing rewards and monetary incentives for collecting or returning plastics. Some have negative attitudes as there remains some limitations of affordable and available eco-friendly alternatives, the lack of social and community pressure as well as enforced mechanisms. To reduce the use of plastics and plastic pollution, policymakers should take certain measures, such as emphasizing awareness programs, public education, and engaging educational institutions, establishing reward-based projects, and strengthening recycling and waste management programs.

According to Banu (2019), mankind produces over 400 million tons of plastic worldwide, of which 79% are disposed of in nature, and "only 12% are burned, as well as 9% are reprocessed." Because of globalization, plastic production increases which is used by various institutions and the percentages of the use are "36% in the packaging industry, 16% in construction, 14% in textiles, 10% in consumer and institutional products, 7% in transport industries, 4% in electronic industries and rest by other institutions." As a result of the usage of plastic, not only human suffers from various diseases such as "cardiovascular disease, type 2 diabetes, carcinomas in adults and liver abnormalities" but also other animals are affected like reproductive issues, disability in movement and so on. To decrease the use of plastic, various countries have taken action. Bangladesh was the first country to ban the sale and manufacture of plastic bags. Among other nations, Ireland adopted tax imposition strategy which was a great success in banning plastic bag, the Plastic Bag ban policy is taken by South Africa which had a poor response as there needed other policies to support the ban, lack of enforcement and poor waste management system was the main cause of the failure of Plastic Bag Ban in India, fines, continuous monitoring, enforcement system cause a huge success in Tanzania and Kenya. Thus, illegal production, mismanagement of waste, poor enforcement, individual perception, and pricing are the reasons for the failure of banning plastic bags whereas tax imposition, fines, proper enforcement, and innovative measures are the reasons for the success.

According to Sadia Akter (2024),Plastic has become a vital commodity due to the widespread use but poor management in some areas and lack of awareness make the use of plastic a hazard. Poor management of plastic creates environmental concerns both for marine and human life. The main reason behind poor management is lack of facilities, slow progress in infrastructure development and small budget. 1 million plastic bottles are brought in one minute around the world. Even one survey found that the plastic bottles sold in 2018 would be taller than the Burj Khalifa. Every year we Produce 100 tons of plastic which creates an unhygienic atmosphere and helps to breed insects and mosquitos. Our marine life is also in danger because every year we dump eight million tons of plastic into the ocean which doesn't vanish from the water. Besides, the constitution of Bangladesh doesn't have any specific law related to the environment but in India, Malaysia and other countries have specific laws for protecting the environment. BELA and BLAST Write about people suffering due to environment pollution and Water logging and various water wastes, leading to inhuman life for the residents. Government taking various initiatives and also collaborating with NGOs and other Organization to improve waste management.

According to (Proshad et al., 2017), plastic use has become widespread due to its affordability, versatility and durability. But it is also putting pressure on human health and the environment. The chemicals used while producing the plastic bags are dangerous for children and pregnant women causing long term health consequences and fetal diseases. Plastic creates air, soil and water pollution and imbalances the ecosystems. The people of Bangladesh have a lack of awareness about these toxic risks. The government of Bangladesh has not taken necessary steps for the proper implementation. Government had taken the plastic use ban law in 2002 but due to public ignorance and poor implementation process, the law didn't enact properly. Its wide use makes it flexible and also dangerous because it has the ability to enter into the human body via food, air, dust and medical services.

Methodology

Data for this study were gathered through a structured questionnaire following a non-probability purposive sampling procedure, picking 450 respondents from the Dhaka North City Corporation (DNCC) under Dhaka City. The study covers the areas- Mirpur, Pallabi, Uttara, Mohammadpur, Agargaon, Dhanmondi, Banani under the Dhaka North City Corporation.

Plastic pollution is worse in Dhaka than in other cities. The annual per capita plastic use in the capital, Dhaka, is 22.25 kg, more than three times the national average for urban areas. Every day, 646 tons of plastic waste are collected in Dhaka, accounting for 10% of Bangladesh's total waste production. In Dhaka, just 37.2% of plastic waste is recycled. (World Bank, 2021).

The mixed-method research follows a cross-sectional study to examine the effectiveness of banning plastic bags in urban areas in Bangladesh. The quantitative research has been accompanied by an evaluation and exploration of people's awareness about the ban on plastic bags in Bangladesh, focusing on exploring the existing scenario of the effectiveness of the ban and analyzing to what extent the government needs to play its role effectively. The qualitative study has been incorporated to identify the challenges and prospects associated with the effectiveness of the plastic banning decision in Bangladesh and present recommendations for the existing scenario.

The mixed-method study employed a survey questionnaire that included both closed-ended and open-ended questions. Non-probability purposive sampling involves targeting a specific group of individuals who use plastic bags on a daily basis. This sampling method enabled the collection of data from individuals. The random selection of 450 households demonstrated the feasibility of obtaining a sufficient sample size. The study also includes eight semi-structured interviews with individuals from different households

Data Analysis Techniques

The study applied SPSS (Statistical Software for Social Sciences), version 25, to analyze the data. Based on the Kolmogorov-Smirnov and Shapiro-Wilk tests ($p < 0.05$), the data were not normally distributed; therefore, non-parametric statistical tests were applied. To explore relationships among the variables in the data, the study employed the Chi-square, Spearman's Correlation Coefficient. The reliability of the internal consistency of the constructs has been tested using Cronbach's Alpha. The study also includes Exploratory Factor Analysis (EFA) using principal component analysis and varimax rotation. Data were calculated using a 95% confidence level, which means that the estimated findings should fall within the calculated confidence intervals. The study also employed a 5% level of significance (0.05) to minimize the likelihood of making an error.

Findings

Socio-Demographic Profile of Respondents

Table 1 presents the demographic characteristics of the individuals who participated in the survey (n = 450). According to the demographic characteristics of individual who participated in the survey, the majority of respondents (76.5%) fall within the 21-30 age group, followed by 19.5% in the 10-20 age group. A small percentage (4) belongs to the 31-40 category. In total, 37.5% (n = 169) of the participants were male, and 62.3% (n = 281) were female. Among respondents, a significant portion (74.4%) hold an honors degree, followed by HSC graduates (14%), master's degree holders (10.2%), and SSC graduates (1.3%). In total, 87.4% of the respondents were students, 7.8%, 2.2% were entrepreneurs, and 1.7% were unemployed. The number of family member group distribution shows that the member range of (1-4) include the majority (53.4%) of the respondents, followed by (5-8) of member range with (44.6%), (9-12) of member range with (1.1%) and 0.9% member belongs to the (13-16) member range group.

Table 1: Demographic Characteristics of the Participants

Variables	Category	Frequency	Percentage
Age	10-20	88	19.5
	21-30	345	76.5
	31-40	18	4
Gender	Male	169	62.3
	Female	281	37.5
Educational qualification	SSC	6	1.3
	HSC	63	14.0
	Honors	335	74.4
	Masters	46	10.2
Occupation	Employee	35	7.8
	Entrepreneur	7	1.7
	Housewife	10	2.2
	Student	394	87.4
	Unemployed	4	.9
Family member	1-4	241	53.4
	5-8	201	44.6
	9-12	5	1.1
	13-16	3	0.9

Background Information of Respondent about Using Plastic Bags in Household:

Table 2 represents the knowledge about the banning decision, usage, and awareness among the respondents. The study revealed that most participants (93.3%) have sufficient knowledge about the banning decisions. However, plastic bags were still used in most of the respondents' houses (84.7%). The frequency of use of plastic bags was as follows: always (44.9%), often (31.6%), sometimes (19.8%), rarely (3.6%), and never (0.2%). Additionally, 54.3% of respondents reported reusing plastic bags. Regarding awareness, 32.2% of the total respondents' family members were slightly aware, and another 32.2% were moderately aware, while 20.6% were not aware at all, 13.1% were very aware, and 1.8% were extremely aware.

Table 2: Current Scenario of Implementation of Banning Plastic Bags

	Frequency	**Percentage**
Knowledge about the banning decision		
Yes	420	93.3
No	30	6.7
Usage of plastic bags in the household		
Yes	382	84.7
No	68	15.3
Reusing plastic bags		
Yes	245	54.3
No	205	45.7
Awareness among the family's other members		
Not aware at all	93	20.6
Slightly aware	145	32.2
Moderately aware	145	32.2
Very aware	59	13.1
Extremely aware	8	1.8
Frequency of use		
Always	202	44.9
Often	142	31.6
Sometimes	89	19.8
Rarely	16	3.6
Never	1	.2

Analysis of Spearman's Correlation Coefficient:

Table 3 represents the Spearman's Correlation between the number of family members and the average number of plastic bags used per week among respondents. According to the value (-0.073), it can be said that there is a negative correlation between the two variables. The weekly usage of plastic bags doesn't depend on the number of family members. Instead, it may rely on their habit or need related to the regular waste collection, food packaging, and so on

Table 3: Spearman's Correlation between the number of family members and the average number of plastic bags used per week

Hypothesis	Value of R
H0: There is no association between the number of family members and the weekly use of plastic bags in the household. H1: There is an association between the number of family members and the weekly use of plastic bags in the household.	-0.073

Table 4 indicates whether a relationship exists between two categorical variables or not. Through the Chi-square test, the study finds an association between the frequency of usages of plastic bag usage and the awareness level among respondents' other family members.

Table 4: The relationship between two categorical variables (Chi-Square)

Hypothesis	Value	Decision
H0: There is no association between the frequency of usage of plastic bags and the awareness level among respondents' other family members. H1: There is an association between the frequency of usage of plastic bags and the awareness level among respondents' other family members.	.032**	Null hypothesis rejected
H0: There is no association between the usage of plastic bags and awareness level among respondents' other family members. H1: There is an association between the usage of plastic bags and the awareness level among respondents' other family members.	.000**	Null hypothesis rejected

H0: There is no relationship between cultural habits and usage of regular plastic bags in households. H1: Has a relationship between cultural habits and usage of regular plastic bags in households.	.052*	Null hypothesis accepted
H0: There is no relationship between the Government's effort in enforcing the ban and the adherence of local businessmen. H1: Has a relationship between the Government's effort in enforcing the ban and the adherence of local businessmen.	.000**	Null hypothesis rejected

*N.B P**<0.05*

Table 4 represents the relationship between two categorical variables. Here. The p-value (.032) of the relationship between the frequency of usage of plastic bags and awareness level among respondents' other family members indicates that the null hypothesis is rejected. It suggests an association between the frequency of plastic bag usage and the awareness level among respondents' other family members. Then, the P-value (.000) of the relationship between the use of plastic bags and the awareness level among respondents' other family members indicates that the null hypothesis is rejected. That means there is an association between the usage of plastic bags and the awareness level among respondents' other family members. A strong relationship has also been revealed between the government's efforts in enforcing the ban and the adherence of local businessmen to the prohibition (P = .000). On the other hand, no relationship was found between cultural habits and the use of regular plastic bags in households (P = .052).

Factors affecting the effectiveness of banning Plastic bags

Reliability Test

Reliability is the measure of internal consistency of the constructs in the study. A construct is reliable if the Alpha (α) value is more significant than .60. Construct reliability has been assessed in this study using Cronbach's Alpha. The results revealed that the waste management practices, as measured by eleven items (α = .689), were reliable.

Exploratory factor analysis (EFA)

Factor Analysis (EFA)An EFA has been performed using principal component analysis and varimax rotation. The minimization factor loading criteria have been set to 0.50. The scale's commonality, which indicates the amount of variance in each dimension, has also been assessed to ensure

acceptable Exploratory levels of explanation. The results show that all commonalities are over 0.50.

Table 5: Exploratory factor analysis (EFA)

Item	Component 1	Component 2	Component 3	Component 4
Proper waste management	.824			
Public Awareness campaign	.796			
Lack of penalties	.785			
Strict enforcement	.678			
The availability of affordable alternative	.589			
Adherence to the plastic bag		.804		
The government's effort		790		
Lack of alternative			.612	
Awareness among family members				.858
Cultural Habits				.514

The study included eleven items relating to waste management practices and environmental support for factor analysis using Principal Component Analysis (PCA) with Varimax Rotation. The value of the Kaiser-Meyer-Olkin measure of adequacy is 0.798, which is above the recommended value of .60. Bartlett's test of Sphericity was significant, x2 (n = 450) = 1211.780, as the p-value is determined (.000 < .05). The Eigenvalue > 1 determines that the analysis is fit for four factors explaining a total of 64.824% of the variance of the data. Factor 1 is labeled "waste management efficiency" due to high loadings in the following items: proper waste management, public awareness campaigns, lack of penalties, strict enforcement, and the availability of affordable alternatives. Factor 1 explains 27.686% of the variation after rotation. Factor 2 is labeled government initiatives due to high loadings in the following items: adherence to plastic bag regulations and government efforts. Factor 2 explains 13.860% of the variation after rotation. Factor 3 is labeled "Preference for alternatives due to

its high loading on preference for alternative options. Factor 3 explains 13.011% of the variation after rotation. Factor 4 is labeled social and cultural influence due to high loadings in the following items: awareness among family members and cultural habits. Factor 4 explains 10.267% of the variation after rotation.

The qualitative analysis of the study further finds that the effectiveness of the plastic banning decision depends on proper waste management methods, public awareness, penalties, and the government's strict enforcement. Additionally, awareness about environmental protection can also contribute to the overall effectiveness of the ban in both urban and rural areas. Respondents revealed that the lack of Government intervention and coordination is responsible for the ineffectiveness of the ban. Interviewees stated that before alternative employment can be arranged for plastic factory workers, the decision to ban plastic bags should be fully implemented. Primarily through self-awareness and human health concerns, the general public will help decide to ban plastic bags more effective.

Discussion

On the one hand, broad access to plastic products has made humans' lives simpler and smarter, but on the other, it has led to long-term environmental contamination due to the formation of excessive garbage resulting from excessive production and use. Because the most commonly used plastics are non-biodegradable and disposable, when left unchecked, they accumulate in landfills or the natural environment, contaminating various environmental compartments, including air, soil, and water (Hossain et al., 2021). According to World Bank data from 2018, 234,000 people perished as a result of environmental pollution in Bangladesh, with 80,000 living in cities. Because of their low solubility and resistance to microbial breakdown, the heavy metals produced during plastic combustion act as soil contaminants, endangering human metabolism. Bangladesh was the first country to pass anti-plastic bag laws. ESDO is the first organization in Bangladesh to ban plastic bags (Hossain et al., 2021). Plastic bags were banned in Bangladesh in 2002. Surprisingly, many respondents were unaware of the restriction. Their awareness gap contributes to the use of plastic bags in communities. Most consumers do not protest when shops transfer goods through plastic bags, indicating consumer unawareness and, to some extent, a lack of responsibility for following the ban (Ifthear Hossen Shawon, 2022). This

study emphasizes that one of the vital reasons for the usage of plastic bags is their availability and the comparatively high cost of the alternative bags. 25.7% of respondents are highly supportive of the ban decision, while only 4.4% are opposed to it. It indicates that only creating awareness is not enough for the effective implementation of banning plastic bags. The cost of alternative bags should be reduced so that the general public can use them without facing any hassles or challenges. Alternative employment opportunities for plastic workers is another major issue contributing to the ineffectiveness of the ban, which is why alternative jobs should be allocated to them to maintain their income. 28.6% of the respondents think that cultural habits and resistance to change are significant barriers to the success of the ban.

This study also finds that, despite having sufficient knowledge about the ban decision, most respondents continued to use plastic bags in their homes. There is an association between the frequency of usage of plastic bags and the awareness level among respondents' other family members. On the other hand, there is no relationship between cultural habits and the use of regular plastic bags in households.

Proper waste management, public awareness campaign, lack of penalties, strict enforcement and availability of affordable alternatives may increase the effectiveness level of implementation of banning plastic bag. Government penalties play a significant role in the success of the banning decision, 27.7% of the respondents strongly agree that the lack of penalties for using plastic bags decreases the effectiveness of the ban. Government must take strict initiatives for the law’s enforcement and arrange awareness campaigns and workshops for the general people to let them know about plastic’s adverse impact on our environment and health.

Conclusion and Recommendations

This study aims to understand the effectiveness of banning plastic use, primarily in the Dhaka North City Corporation, by analyzing behavioral factors, people's awareness, and the government's voluntary efforts. The ban on plastic use is a critical environmental policy implemented by our new interim government to reduce plastic pollution, improve waste management, save the Dead River, minimize public hassle during floods, clear drainage problems, and balance the ecosystem to ensure a better quality of life for the

people of the country. After two decades of the ban policy, its effectiveness became questionable. Lack of public awareness, insufficient infrastructure, the absence of alternatives, and inadequate enforcement were the primary obstacles to implementing the plastic ban policy in 2002. The retail community is highly dependent on plastic despite the ban policy for its affordability and advantages. Alternatives of plastic bags are jute and cloth bags but it is costly and low accessibility. Jute bags and paper bags are eco-friendly substitutes, but they are not widely adopted among people, particularly those with lower incomes, because they cannot afford the costly alternatives. Rapid urbanization and the expansion of industrial areas are also contributing factors to the unsuccessful implementation of the policy. Weak recycling mechanisms and an inadequate waste management system also pose a barrier to effective enforcement.

The study recommends that the government should take alternative methods, such as using jute or paper bags, to enhance the effectiveness of the plastic bag ban. Jute cultivation and the growth of the jute industry are also needed for making alternative bags. A cost-free or reduced price, the good quality of alternative bags, or strong and easy-to-handle alternative bags while carrying juicy items can be effective in the ban. Moreover, public awareness campaigns that improve the mindset about environmental pollution can be a way to enhance the effectiveness of the ban. "We see, we do," and it's Bangladesh; So, the ads or promotions on social media, TV, or websites related to the ban and eco-friendly environment can be another way. Besides the government should take necessary steps to provide jobs for the employees who are working in plastic factories before banning the plastic industry. After doing these initiatives the government should focus on strict rules implications. The ban on plastic use is a step towards environmental sustainability. So, not only government initiatives but also NGO’s, industries and corporate sectors, consumers, retailers, social communities, environmental agencies can come forward to ensure a successful and a long-term sustainable implementation of the policy to reduce plastic bags in Dhaka city.

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Youth Entrepreneurship and Its Impact on Employment Creation: A Study on University Students of Bangladesh

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Abstract

Youth entrepreneurship has emerged as an important solution to dealing with unemployment and economic downturns in developing countries like Bangladesh. Although the current research literature tends to emphasize the general economic environment, a limited focus has been given to university students of Bangladesh who intend to establish their careers in entrepreneurship, and this research addresses that gap. This study's key objective is to assess university students' youth entrepreneurship and its contribution to employment creation in Bangladesh. The study followed a mixed method, containing both qualitative and quantitative approaches to collecting data through simple random and snowball sampling. This included a survey of 440 students and in-depth interviews (IDI) of 10 students from different universities in Bangladesh who run their entrepreneurial businesses. The study found a statistically significant association between access to funding and the number of people employed in the business as per the chi-square test result ($p<0.05$). The study showed that access to funding in youth entrepreneurship plays an influential role in determining the level of employment creation. On the other hand, the study found a relationship between support from university programs ($p>0.05$). It confirmed that the university programs might generally support university-going entrepreneurs,

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but they do not appear to influence employment levels significantly. The study addressed some of the significant challenges students faced in entrepreneurship, including financial risks, lack of funding, lack of mentorship, competition in the market, etc. Entrepreneur students from various universities can benefit from increased access to funding, mentorship, and skill development by networking with venture capitalists through various university programs. Promoting entrepreneurship will ultimately help minimize the unemployment problem in Bangladesh

Keywords: Youth Entrepreneurship, Employment, University Students, Bangladesh.

Introduction

Bangladesh is a developing country with a swiftly advancing economy. In recent years the country has witnessed a new boom in entrepreneurial activity through small and medium-sized enterprises (SMEs) which are also leading the way in economic progress (Meng et al., 2021). Basically, an entrepreneur is a person who performs agency and takes initiative, puts himself in a position of responsibility for achieving results, is ready to take action, and embraces innovation by anticipating any danger (Johnson, 2001). Creating value for society by starting a new business is also a significant prominence of an entrepreneur (Holt 1992). Entrepreneurship has been defined in various ways over the past 800 years. The word comes from the French word “entrepredre” which means "to do something". The word was already in use in the 12th century, and its noun form was developed by the 15th century. Related English words e.g., adventurer and undertaker (referring to "Merchant Adventurers") that used to describe business risk takers were introduced around the same time. Richard Cantillon's work (published in 1730) contains the earliest formal theoretical application of the notion of entrepreneurship (Long, 1983). As per (Hoselitz, 1951) the word ‘*entrepreneur’* was not introduced by Jean-Baptiste Say in economic literature while many economists believed he was. Later research found that Richard Cantillon had already talked about the role of entrepreneurs around 1730. And even before that, François Quesnay had coined the term "*entrepreneur*." This indicates that J. B. Say. contributed to the idea's popularity even if it existed before.

According to (Chowdhury, 2017) Bangladesh has tremendous opportunities to flourish the entrepreneurial sector as a developing country.

There are three stages of opportunities available that are interconnected and come from government or private sectors. Stimulatory opportunities help individuals through entrepreneurial education, role play (providing practical experiences), access to natural resources to build confidence and skills for starting businesses. Supportive opportunities help entrepreneurs grow their businesses by providing training, logistic, financial and technological support. Whereas sustaining opportunity provides encouragement by providing other marketing assistance including motivational support, policy improvement, and promotional assistance.

Currently Bangladesh is offering a very healthy and supportive environment for the entrepreneurs that is driven by abundant natural resources like fertile land and valuable mineral deposits along with a motivated and industrious workforce. Programs like Bachelor Entrepreneurship Development (BED) at Daffodil International University, UIU entrepreneurship forum, NSU Business Club, AIUB Business Club provide theoretical and real world skills to the students that they need to succeed in the corporate world. Several government organizations including Bangladesh Development Bank (BDB), Bank of Small Industries and Commerce (BASIC), Investment Corporation of Bangladesh (ICB), Bangladesh Standard and Testing Institute (BSTI), Bangladesh Council of Scientific and Industrial Research (BICSIR), Export Promotion Bureau (EPB), Industrial promotion and Development Company of Bangladesh (IPDCB) and government supported private organizations i.g., Commercial Banks, Private Insurance Company, Grameen Bank, Industrial Development leasing Company of Bangladesh Ltd. (IDLC), United Leasing Company (ULC), Saudi Bangladesh Industrial and Agricultural Investment Company Ltd. (SABINCO), The Bangladesh German Chamber of Commerce and Industry(BGCCI), Dhaka Chamber of Commerce and Industry (DCCI), Proshika, The Federation of Bangladesh Chamber of Commerce and Industry (FBCCI) etc are there for any kind of assistance to the entrepreneurs (Chowdhury, 2017).

Also there remains a challenging endeavor due to economic and social disparities compared to developed nations despite having a vast human resource (173 million people in 2023). Financing problems, legal issues, improper marketing channels, improper publicity of government facilities, social aperture, higher interest rates, lack of mentorship, lack of education,

ignorance, sloppy or weak political portrayal, religious constraints, and lack of technological or managerial knowledge are some of the things that impede the growth of entrepreneurship (Ullah, 2020).

A solid number of papers on entrepreneurship have been conducted in Bangladesh however there is a scarcity of studies focusing on the RESEARCH GAP. Because unemployment has been shown to be a major obstacle to Bangladesh's economic progress, this research is a must. Especially for university students, as future leaders and workforce participants who have the potential to enlarge the country's economic growth through entrepreneurship. By assessing the youth entrepreneurs, this study will help to find alternatives to the unemployment issue. The findings would provide insights into the factors that influence them towards entrepreneurship, the challenges they face, and the opportunities that are available to pursue it. Understanding these aspects will help policymakers, universities as well as other stakeholders to create a sound environment for the upcoming and existing entrepreneurs in a way that would be beneficial for them. Thus this paper aims to evaluate the role of youth entrepreneurship among university students and its contribution to employment creation in Bangladesh. By identifying opportunities and challenges faced by the students, it provides insights into how entrepreneurship can be strengthened as a solution to some complex problems.

Literature Review

Youth entrepreneurship stands crucial for nation-building activities because it drives economic development together with employment opportunities and inventive solutions. Business startups help fight unemployment by giving entry points to young employees and developing their expertise. The potential for business involvement by youth remains limited because they face obstacles such as restricted financial access and political instability together with insufficient education about entrepreneurship. Government policies designed to encourage entrepreneurship demonstrate weak outcomes because bureaucratic errors and insufficient implementation practices prevent them from being effective. By providing financial support alongside training and reforming policies obstacles to youth entrepreneurship will strengthen and support sustainable economic growth (Fadeyi et al., 2015).

According to Ahaibwe and Kasirye (2015) youth entrepreneurship stands as a fundamental tool to create jobs especially among developing countries with their employment spaces already filled up. Research indicates that while financial access remains essential it is equally vital for sustainable business development to receive mentorship together with training and institutional backing (ILO, 2012). The Youth Venture Capital Fund of Uganda (UYVCF) drives business development yet faces barriers towards job generation because of funding limitations and management issues. The same research conducted in Kenya and South Africa shows that combined services for entrepreneurs lead to better outcomes (Fafchamps et al., 2011).

The study conducted by Vogel (2013) explores how entrepreneurial ecosystems help solve youth unemployment by showing the importance of organized support structures including governmental interventions together with financial assistance and skill development programs. This study reveals problematic coordination and operational effectiveness of current entrepreneurial activities because these activities mainly do not align with national economic plans. This research adds value to youth entrepreneurship and employment creation studies by establishing a systematic data-based framework to develop ecosystems which produces continuous job opportunities through entrepreneurial ventures.

Njoku (2024) describes how education programs for entrepreneurs help young individuals gain power and establish employment opportunities while reducing poverty. This study illustrates the business startup capabilities of young students in combination with their enhanced industry marketability and shows how entrepreneurial teaching elements of innovation and creativity support economic development at different levels within the system. Quality education proves more important than raising educational length for developing competent abilities. The research evaluates Nigeria's economic difficulties caused by high unemployment levels along with proposing educational strategies to include entrepreneurial education at all educational levels. Social problems coupled with economic sustainability gain first priority in entrepreneurial education because it provides solutions for unemployment and poverty and makes societies financially sustainable.

The startup ecosystem of Bangladesh continues to grow because it receives government support from national and international investors with its population composed of technical experts and young people. Startup success in Bangladesh happens due to continuous growth in the middle class segment with elevated numbers of mobile users and Internet subscribers and expanding digital economic opportunities. Funds flowing into Bangladesh mostly support fintech services and logistics industries while also aiming at e-commerce businesses and education technology. Startup Bangladesh Limited operates high-tech parks which aid new startup ventures through new incubator and accelerator facilities. A significant transformation occurs within the ecosystem because more than 2,500 startups established substantial economic measures and employment opportunities. The startup ecosystem encounters two main barriers including regulatory impediments and lacking capital availability alongside the need to promote gender equality in investment. Bangladesh startup growth demands policy adjustments as well as accessible funding and corporate training for maintaining high momentum (Bangladesh Startup Ecosystem Assessment Report, 2022).

Although studies exist on various social business aspects such as social entrepreneurship traits and social company establishment barriers there is little research about how Social Business Funds (SBFs) impact youth economic conditions specifically. Ferdousi et al. (2022) argued that social business remains fundamental in handling financial difficulties that young entrepreneurs face. The research investigates the Nobin Equity Program (NEP) to fill this knowledge gap because this particular program targets young micro-entrepreneurs with educational support and financial resources. The study applies agency theory along with utility theory to investigate how SBFs enhance both earnings and spending of young entrepreneurs thus expanding knowledge about social entrepreneurship. The study demonstrates that SBFs create substantial impacts on the financial outcomes of entrepreneurs because financial help with training and supporting programs can boost their economic situation.

Amin (2019) investigates Dhaka City youth entrepreneurship by studying the reasons that drive online businesses and identifying obstacles experienced by young entrepreneurs. Through qualitative research the study demonstrates that young individuals start their own businesses because they

find no chance for employment and receive low-paying salaries. The online business sector contains three major obstacles which include social recognition challenges and business security issues and restricted growth options. The analysis investigates the influence of digital platforms especially Facebook towards facilitating entrepreneurial activities. Research shows that economic pressure drives most youth involvement in establishing businesses since they need to operate due to financial limitations rather than spotting new business prospects. The study encourages policies combined with financial backing and training for initiatives that will boost sustainable youth entrepreneurial activities across Bangladesh.

Quauim & Hossain (2024) evaluate how public universities contribute to youth empowerment through entrepreneurship education in Bangladesh. Students face barriers in starting and maintaining businesses because academic institutions mainly offer theoretical skills without sufficient practical skill building. The paper outlines three main barriers which include old curriculum frameworks along with weak relationships between education institutions and businesses and insufficient governmental financial support. The research indicates that business success among youths improves through practical training and mentoring strategies combined with institutional backing. This research recommends that entrepreneurship education needs to adapt to current industry needs for building an environment that promotes sustainable business competitiveness. The necessary policies combined with stakeholder involvement aim to create connections between classroom education and practical entrepreneurial obstacles.

The level of entrepreneurial activity shows a direct negative relationship with unemployment because high entrepreneurial activities lead to new employment opportunities. The education received about entrepreneurship shapes students' career decisions by teaching them fundamental entrepreneurial competencies for business startup. Support programs from training institutions together with government interventions help young entrepreneurs but they experience limitations in funding acquisition and confront social barriers. Intensifying entrepreneurial attitudes across society results in social-economic advancement through efficient resource management while solving market deficiencies. Bangladesh needs both policy interventions and financial support and skill development

programs to maintain entrepreneurship as an effective career path for its young people (Rahaman & Podder, 2023).

Extensive research about youth entrepreneurship tends to focus its examination on financial obstacles combined with policy deficiencies and educational programs which promote self-employment. However, the investigation of employment generation from youth entrepreneurship lacks substantial research especially among university students in Bangladesh. Existing literatures demonstrate that entrepreneur success relies on financial support as well as skill training with mentor guidance yet fail to provide data-based evidence about student-business startup effects on job creation. The evolving startup market in Bangladesh faces barriers, including inadequate capital availability and regulatory restrictions that impede long-term growth. Therefore, a detailed examination of the relationship between university entrepreneurship programs and students' business initiatives, along with their employment creation needs, is warranted to investigate the economic environment of Bangladesh further.

Methodology

Research Design

This study employed a mixed-methods research design, blending qualitative analysis with quantitative procedures to investigate youth entrepreneurship and employment creation among university students in Dhaka City, an educational hub in Bangladesh that hosts the largest number of public and private universities.

This research obtained its data from two primary sources. The quantitative, structured survey collected data on entrepreneurial business statuses from a wide range of university students. Interviews with students running their businesses for three years or more provided extensive qualitative information that mirrored their survey responses about the entrepreneurial environment of Bangladesh. The research constructed its analysis by using official reports combined with document analysis, reviewing existing literature, online articles, and newspaper reports as secondary data resources.

Data Collection method

The study incorporated primary and secondary data. Primary data were gathered through online surveys and in-depth interviews. The study utilized Google Forms to collect a total of 440 responses through structured questionnaires, targeting respondents who operated entrepreneurial firms for this research project. The survey was delivered through social media platforms, including Facebook Messenger and WhatsApp. The interviewees were selected from personal networks and peer networks through a combination of simple random sampling and snowball sampling. A total of ten in-depth interviews yielded the collected qualitative data. The study conducted six interviews via phone calls, and the additional four interviews were conducted face-to-face. The research obtained secondary data through a combination of document analysis and examinations of existing literature, online articles, and newspapers.

The respondents for the study were chosen following simple random and snowball sampling. According to the University Grant Commission (UGC), as of 2022, the Dhaka division comprises 17 public universities and 69 private universities. Therefore, the total number of students in the Dhaka division is around six lakhs. Considering the acceptable sampling error, E = 0.05,

$$n = \frac{N}{1+N \times (e)^2}$$

$$= \frac{600000}{1+600000 \times (0.05)^2}$$

$$= 399.73$$

(n = Sample size, N = Population size, E = Acceptable Sampling Error)

According to this formula, to justify the research, considering a total number of students of approximately 600,000 and an acceptable sampling error of 0.05, a minimum of 399 respondents is required. Therefore, 450 respondents have been allowed for the convenience of the study.

Data Analysis Techniques

The research employed a structured survey questionnaire that students from various universities in Dhaka completed through Google Forms. A Microsoft Excel and SPSS software analysis system was used to process the collected responses. Microsoft Excel received the initial task of data set, along with response cleaning, to ensure well-ordered data input. Basic descriptive statistical procedures have been employed, utilizing both frequency distributions and percentages, to summarize the collected information. Furthermore, a chi-square test was performed using SPSS to analyze the relationships between key variables. The chi-square test functioned to detect any statistically important connections among the fundamental variables under this research.

Ethical Consideration

The research adhered to strict ethical procedures to protect the rights and dignity of all participating subjects. The participants provided their informed consent before participating in the study, having understood the research purposes and methods. Every participant received assurance regarding their freedom to discontinue their study participation without experiencing a negative impact. The research protected participant privacy through strict policies regarding data anonymity and used the information only for research purposes.

Result

Socio-Demographic Profile of the Participants

This study was conducted with data from respondents (n=450) studying in both public and private universities of Bangladesh. Table 1 shows the socio-demographic profile of these respondents of whom, 16.2% are aged between 18 to 22 years, 53.8% are aged between 23 to 25 years, and 30% are of age 25 to 30 years. Among the respondents, 43.7% were male, and 56.3% were female. Majority of the youth entrepreneurs (73.3%) are students of Bachelor's, while 26.7% of respondents are Master's students. Regarding their area of study, 34.5% of the respondents were of Business Studies, 55.7% were of Faculty of Arts and Social Sciences, and 9.8% were of Faculty of Science and Technology.

Table 1: Socio-Demographic Profile of the Participants

Demographic Characteristics		(%)
Age	18-22	16.2
	23-25	53.8
	25-30	30.0
	Total	100.0
Gender	Male	43.7
	Female	56.3
Level of Education	Bachelor's	73.3
	Master's	26.7
Area of the Study	Business Studies	34.5
	Faculty of Arts and Social Sciences	55.7
	Faculty of Science and Technology	9.8

Background Information of the Respondents about their Business

Table 2 represents the type and mode of entrepreneurial activities of the respondents. The study revealed that 76.4% of the respondents have a business that runs all year, while 23.6% of the respondents have a seasonal business. Regarding the mode of business, more than half (57.9%) of the respondents run their business through online method, 18.7% of the respondents follow offline method, while the rest (23.4%) of the respondents use a mixed method of both online and offline.

Table 2: Background Information of the Respondents about their Business

What type of business are you running?		
	Year Round	76.4
	Seasonal	23.6

In which mode do you run your business?		
	Online	57.9
	Offline	18.7
	Mixed	23.4

Factors Affecting Employment in the Business

Chi-square statistics have been used to examine the association between affecting factors such as access to funding, support from university programs and family, etc. and the number of people employed in the business. From the chi-square test results shown in Table 3, the study finds that access to funding have a significant relationship with employment creation in youth entrepreneurship (p=.014). This indicates that adequate financial resources are a critical factor for the expansion of youth entrepreneurs and employment generation.

Table 3: Factors Affecting Employment in the Business

Significance (P - value)	
Affecting Factors	**Number of Employment**
Access to Funding	.014*
Support from University Programs	.180
Family Support	.414
Government Initiatives	.263
Networking Opportunities	.366

*p<0.05

One of our respondents from "X" University who runs a Travel-tech startup, shared the story of growing his business stating,

> *We initially started our business as a group of four friends and right now we have 12 employees. So far, we have received investments from four different entities. We received investments two times by winning startup competitions at national level, we received a fund through collaborating with an investment company and the other one we received by utilizing the network of a previous investor.*

According to his statement, investment plays a critical function in achieving entrepreneurial organization growth together with sustainability. Startups need secured financial support to increase their operation scale and workforce capacity and achieve higher business competency. The respondent demonstrated three essential methods through which young Bangladesh entrepreneurs can find investments by maneuvering competitive funding routes, strategic alliance development and utilizing investor groups. Entrepreneurial access to capital for youth depends on more than direct investments since they can reach funding through well-established credibility within the startup network and strong relationships.

On the other hand, the study found no significant relationship between the number of employees and other affecting factors. Calculated p-value from chi-square tests of other affecting factors, including support from university programs (p=.180), family support (p=.414), government initiatives (p=.263), and networking opportunities (p=.366), are all indicative of a p-value ($p>0.005$) greater than the expected value for having an influential relationship. Therefore, these factors may support the growth of entrepreneurial business, but they do not pose any direct significance in creating employment opportunities.

Perception of Entrepreneurs about their Contribution in Employment Creation

Table 4 shows the perception of the youth entrepreneurs about the contribution of their entrepreneurial activities in direct employment creation. 9.1 % of the respondents feel that their business have no contribution in employment creation as they have not employed anyone under their business.

22.9% of the respondents think they have very little contribution and 31.3% of the respondents think they have moderate contribution. These respondents generally have employed 1 to 5 employees under their business. 31.1% of the respondents believe that they have made high contributions in employment creation, while a smaller group (5.3%) believes their entrepreneurial activities have made very high contributions. This perception of higher contribution is generally seen among the youth entrepreneurs who have managed to employ more than 5 employees.

Table 4: Perception of Entrepreneurs about their Contribution in Employment Creation

Response	Description	Count	Percentage
1	No Contribution	41	9.1%
2	Very Little Contribution	103	22.9%
3	Moderate Contribution	141	31.3%
4	High Contribution	140	31.1%
5	Very High Contribution	24	5.3%
Total		**450**	**100%**

The study found another valuable insight about recruiting employees as one of our respondents uttered,

> *Seven university students now work for the enterprise under my recruitment. The recruitment process aimed for candidates who shown creative strengths rather than extensive resume length and collaboration willingness. As my social enterprise organization I prioritized selecting team members who brought both creativity and personal responsibility along with collective advancement commitment.*

Here, the growing movement of social entrepreneurship has been followed that combines financial success with social impact to allow young staff members' productive contribution to both economic growth and social progress.

Challenges in Business

Of the 450 respondents, 190 of the youth entrepreneurs (42.2%) found the lack of funding to be the major challenging factor in their entrepreneurial activities. 33.8% of the respondents believe of lack of mentorship as their leading challenge, while 23.6% of the respondents face the most difficulties in balancing their academics and business. Only 1 respondent (0.2%) thinks of market completion as an influential challenge.

Table 5: Challenges in Business

Response	Count	Percentage
Lack of Funding	190	42.2%
Lack of Mentorship	152	33.8%
Market Competition	1	0.2%
Balancing Academics and Business	106	23.6%
Total	**450**	**100%**

Level of Challenges in Entrepreneurial Activities

Table 6 illustrates the level of challenges perceived by the youth entrepreneurs. The respondents rated the challenges they face in their entrepreneurial activities from 1 to 5 (1=Not Significant, 2=Slightly Significant, 3=Moderately Significance, 4=Highly Significant, 5=Very Highly Significant). From the percentage in each rating, 34.44% of the respondents find difficulty accessing startup capital a highly significant challenge, while 5.33% of the respondents find it not significant at all. 39.78% of the respondents believe the challenge of balancing academic workload with entrepreneurship to be highly significant, while 1.33% of the respondents believe it to be not significant. 35,11% of the respondents note lack of business guidance as a moderately significant challenge, while 1.33% of the respondents find it of no significance. Regarding inadequate government support, 25.78% of the respondents perceive it as moderately significant challenge, while 11.78% of the respondents believe it to be not significant. Lastly, 36.44% of the respondents assume social or cultural stigma around

entrepreneurship as a moderately significant challenge, while 4.67% of the respondents do not find it to be of any significance.

Table 6: Level of Challenges in Entrepreneurial Activities

Challenges	Rating 1 (%)	Rating 2 (%)	Rating 3 (%)	Rating 4 (%)	Rating 5 (%)
Difficulty accessing startup capital	5.33	14.89	23.56	34.44	21.78
Balancing academic workload with entrepreneurship	1.33	11.33	36.44	39.78	11.11
Lack of business guidance	1.33	20	35.11	30	13.56
Inadequate government support	11.78	17.56	25.78	20.67	24.22
Social or cultural stigma around entrepreneurship	4.67	16.67	36.44	30.67	11.56

The qualitative analysis of the study further suggests the significance of financial resources, especially startup capital, in driving employment expansion and fostering entrepreneurial growth. The findings underscore that the absence of adequate funding in entrepreneurial activities lead to numerous shortcomings such as resource constraints, inadequate remuneration for staffs and shortage of skill building training opportunities for employees. As a ripple effect, financial constraints not only have adverse impact on entrepreneurs, but also stifles job creation and economic growth.

The analysis also identifies several other barriers that demotivates entrepreneurs in expanding their activities. Such barriers include lack of institutional and family support, social stigma, etc. Limited access to mentorship, business networks, and government-backed initiatives pose as significant challenges in pursuing entrepreneurship. Social stigma surrounding entrepreneurship also plays a demotivating role as society

perceive it as not enough prestigious and unstable career choice with a higher probability of failure.

Discussion

Experimental research findings confirm that youth entrepreneurship drives job creation as earlier studies showed financial backing and organizational support function as primary catalysts (Fadeyi et al., 2015; Vogel, 2013). Statistical assessment showed that university students achieve substantial employment growth from acquiring funding as an essential business expansion factor ($p<0.05$). Studies from Amin (2019) and Ahaibwe and Kasirye (2015) agree that financial restrictions obstruct entrepreneurial expansion alongside employment formation within developing economies. Business growth together with employment expansion occurred because students succeeded in obtaining investments according to survey participant testimonies. The study established that university entrepreneurship support programs do not create a statistically noteworthy connection with job creation ($p>0.05$). Quaium & Hossain (2024) established that Bangladesh's public universities deliver theoretical instruction instead of practical entrepreneurship learning. A lack of mentorship which persists as an ongoing problem according to survey respondents (33.8%) manifests as evidence toward the inability of educational institutions to deliver practical hands-on guidance required to advance business development and create employment opportunities.

The study reveals the employment generating power of social entrepreneurship by examining how young entrepreneurs conduct their recruitment activities. The research outcomes match what Njoku (2024) establishes through his work about how entrepreneurship education develops employment opportunities and social progress. The businesses applying new recruitment approaches built around teamwork and creativity instead of conventional qualifications support economical growth along with social progress. Rahaman & Podder (2023) confirmed financial limitations (42.2%) and academic-business conflict (23.6%) as obstacles student entrepreneurs encounter although both issues demand institutional policy interventions to support youth business operations according to them. Bangladesh startup sector faces regulation together with capital barriers which necessitate policy

transformation and easy investment conditions and mentorship frameworks for youth entrepreneurship (UNESCAP, 2022). The ability of entrepreneurship to tackle unemployment in Bangladesh depends on strategic funding support and policy changes alongside structured mentorship programs to achieve maximum employment generation.

Conclusion

Youth entrepreneurship plays a transformative role in addressing or dealing with things like unemployment and driving economic growth. This paper highlights that young entrepreneurs conduct their entrepreneurial activities throughout the year, where online platforms act as their main mode of operation. Although these entrepreneurs offer opportunities like self-employment, small-scale job creation, etc. but still limited access to funding and others remain a significant constraint while expanding their ventures and hiring staff. Along with the financial barrier, institutional ineffectiveness, policy inefficiencies, lack of expertise act as a major constraint while innovative business models, technological advancement and supportive government policies can be a solution by creating a sound or favorable environment for entrepreneurship. Although this paper provides valuable insights, some limitations must be acknowledged. The depth of data collection and analysis was somewhat reduced due to time constraints, which has become a barrier to more comprehensive research of this topic. Also, financial constraints, limited availability and interest of respondents, and some external factors (such as economic changes also) may affect the long-term applicability of research findings. The upcoming researchers can address these limitations by incorporating a larger number of participants, longer research duration, and diversified funding sources. Overall, although youth entrepreneurship in Bangladesh shows promise in terms of self-reliance and small-scale employment generation, structural and financial constraints must be addressed in order to realize its full potential and create sustainable employment. Based on the findings discussed earlier, the following area has some policy implications that can help policymakers enhance entrepreneurial opportunities in Bangladesh. 1) The findings have great implications for employment creation and youth entrepreneurship as per the 8th five-year plan (2020–2025). Promoting young entrepreneurship through training and start-up funding accessibility is an integral part of the plan. Special efforts are

required to deal with unemployment and NEET (Not in Education, Employment, or Training) youth. The plan sets a target to reduce the NEET population from 29.8% to 15%. 2) The findings also have great implications on the role of higher education in skill development for university entrepreneurs as per the existing SDG goal-4 'Quality Education'. 3) The study found the importance of digital entrepreneurship, online startups, and digital financial inclusion that directly support the aim of "The National Digital Bangladesh Policy (2021)." To strengthen youth entrepreneurship and its impact on employment creation, the following recommendations are proposed: providing low-interest startup loans by government and private institutions for university-level entrepreneurs, launching easy repayable microloan schemes, and establishing a national youth entrepreneurship fund or offering tax incentives and subsidies. Business incubators and one-stop service centers should be developed to provide training, mentoring, technical assistance, and financing support for fresh and small entrepreneurs. Entrepreneurial training boot camps, both online and offline, should be launched with a focus on business strategies and digital marketing, while compulsory internship programs can be introduced to give students practical experience in startups. Collaboration between industry and academia should be encouraged for knowledge exchange and mentoring, and the business registration process for students should be simplified by reducing legal and administrative complications. Public-private partnerships (PPP) should be strengthened to improve investment and innovation in youth-led entrepreneurship, and gender-responsive policies should be implemented to provide additional support for women entrepreneurs. A national mentoring network should be created to connect experienced entrepreneurs with student startups, and university-run business clubs should be encouraged to facilitate peer-to-peer learning and industry engagement. Access to global networking events and startup accelerators should be strengthened, and a university initiative advisory board with business leaders and policymakers should be established. Digital initiatives should be encouraged by providing free access to e-commerce platforms for student businesses, and high-speed internet infrastructure should be invested in on university campuses to facilitate online business growth. Affordable digital tools and software for marketing and business management should be provided to student entrepreneurs, and support should be given for the development of AI-powered business solutions to foster innovation in youth-led startups. Finally, training programs

in cybersecurity and digital finance should be initiated to ensure secure online business operations.

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Understanding the Challenges of Solid Waste Management: Insights from Urban Bangladesh

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Abstract

Solid waste management is a process that involves the collection, processing, recycling, refuse, reuse and disposal of waste to protect public health and ensure environmental sustainability in a longer run. In Bangladesh, rapid urbanization along with limited waste-management infrastructure have caused significant challenges, resulting either large portions of municipal waste unmanaged or disposed of in open dumps. This study investigates the challenges of solid waste management in Narayanganj City Corporation (NCC) using a mixed-methods approach. A sample of 138 participants was selected based on a 99% population proportion. The results identify key issues in solid waste management within NCC and provide a foundation for future research. A regression model incorporating five independent variables was analyzed using STATA 14. Disposal location ($p = 0.000$) and timeliness ($p = 0.040$) were significant at the 99% and 95% confidence levels, respectively, demonstrating strong associations at $P \leq 0.01$ and $P \leq 0.05$. The p-values indicate an absence of multi-collinearity in the model. Qualitative analysis further revealed challenges, consequences of mismanagement, and the procedures involved in waste management.

Keywords: Service quality perception, Citizen satisfaction, Waste management, Sustainability

Introduction

Urban planning relies heavily on the effective provision of essential services such as industry, housing, waste disposal, and drainage (Rahman, 2008;

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Abubakar et al., 2022). The efficiency of these services varies significantly between countries. In developing nations, limited accountability often leads to inefficiency (Ahmed & Ali, 2004; Guerrero, Maas, & Hogland, 2013), whereas developed countries manage these services effectively with advanced technologies (Mmereki, Baldwin, & Li, 2016; Azevedo et al., 2021). South Asian countries, in particular, face notable challenges in environmental management, while some nations have established comprehensive systems (Dhokhikah & Trihadiningrum, 2012; Hoornweg & Thomas, 1999). Regional factors, including environment, climate, and culture, also play a crucial role in determining the effectiveness of waste management (Vergara & Tchobanoglous, 2012; Castillo & Otoma, 2013). While industrialized countries generate more waste, they often recycle efficiently through formal systems (Mmereki et al., 2016; Abubakar et al., 2022); in contrast, less developed countries produce less waste but rely on a combination of formal and informal management processes (Ali, Tanko, & Kovo, 2017; Ashikuzzaman & Howlader, 2020). A strong correlation exists between national income levels and solid waste management effectiveness: high-income countries manage waste at approximately $100 per ton, whereas low-income countries often manage it poorly at $35 per ton, resulting in environmental pollution and mismanagement (World Bank, 2018; Hoornweg & Bhada-Tata, 2012). Notably, 90% of solid waste in low-income countries is disposed of in ways that adversely affect both livelihoods and the environment (WB, 2018; Abubakar et al., 2022).

Bangladesh, home to over 165 million people (BBS, 2022), faces significant challenges in managing solid waste (Bhuiyan, 2010; Ahmed & Quader, 2011). Waste generation is an inevitable byproduct of daily life, arising from households, industries, medical facilities, and other sources (Alamgir et al., 2011; Asikuzzaman & Howlader, 2020). However, ineffective management has resulted in a persistent crisis that threatens public health and the environment (Rita, 2022; Alam, 2009). Despite initiatives by the Government of Bangladesh (GoB), including short-term (January 2024–December 2030), mid-term, and long-term (January 2031–December 2040) plans to improve waste management (Narayanganj City Corporation, 2021; Staff Correspondent, 2022), improper disposal remains a critical issue (Zurbrugg, n.d.; Thakur et al., 2021; Hoornweg & Bhada-Tata, 2012). Contributing factors include high population density, rapid urbanization, and inadequate infrastructure (Bhuiyan, 2010; Khan, Haque, & Hossain, 2024).

Effective solid waste management is widely recognized as essential for sustainable development and achieving the Sustainable Development Goals (Ahmed et al., 2017; Bowan, 2023). In Bangladesh, however, large amounts of waste continue to be discharged daily, often ending up in rivers and low-lying areas (Narayanganj City Corporation, 2021; Ahmed & Huq-Hussain, 2013). These practices increase the risk of disease, emit toxic gases, and pose serious threats to human health (McAllister, 2015; Rogers et al., 2002). Traditional waste management practices remain prevalent but are poorly aligned with contemporary needs (Jerin et al., 2022; Islam, 2021). Consequently, inadequate systems create disorder and environmental hazards, while many residents bypass official services and dispose of waste in open spaces or water bodies (Bhuiyan, 2010; Hossain et al., 2018; Barnabas et al., 2017; Vergara & Tchobanoglous, 2012).

This study aims to investigate the challenges and causes of solid waste mismanagement in Bangladesh, focusing on Narayanganj City Corporation as a case study (Ahmed & Quader, 2011; Abubakar et al., 2022). The objectives are to assess citizen satisfaction with waste management services, evaluate public understanding, examine policy implementation, and analyze service timeliness (Cervantes et al., 2018; Lagman-Bautista, 2020). By linking solid waste management processes with waste generation, this research develops a conceptual framework that highlights the consequences of mismanagement and explores potential solutions to benefit citizens (Marshall & Farahbakhsh, 2013; Kanchanabhandhu & Woraphong, 2016).

Although prior studies have examined solid waste management in Bangladesh, few provide in-depth analyses of specific local contexts (Ahmed & Huq-Hussain, 2013; Khan et al., 2024). By focusing on Narayanganj; an industrial city generating substantial solid waste; this research identifies the obstacles faced by affected communities and contributes to understanding current challenges in waste management. Following this introduction, the study presents a literature review, develops an analytical framework, describes the research methodology, and reports findings from both qualitative and quantitative data. The study concludes with key insights, implications, and recommendations for future research.

Literature Review

Solid waste management (SWM) encompasses both recycling and disposal processes (Choudhury, 2021) and is typically classified into categories such as wood waste, rubber, and textiles (Ahmed & Ali, 2004; Guerrero, Maas, & Hogland, 2013). Although landfilling remains a common disposal method, it poses significant environmental and climatic risks. Improper dumping not only contaminates soil and water with hazardous substances but also exacerbates public health risks, underscoring the need for coordinated strategies at both national and regional levels (Hoornweg & Bhada-Tata, 2012; Abubakar et al., 2022).

In Bangladesh, recycling initiatives emerged in the 1980s and 1990s (Ashikuzzaman & Howlader, 2020); however, both governmental and NGO-led interventions have yet to achieve their intended outcomes (Ahmed & Huq-Hussain, 2013). A conventional SWM system typically comprises four stages: collection, transportation, disposal, and recycling (Talukder et al., 2021; Marshall & Farahbakhsh, 2013). To promote sustainability, numerous NGOs and community-based organizations are now collaborating to develop effective sorting and recycling mechanisms (Ali, Tanko, & Kovo, 2017; Azevedo et al., 2021).

Ahmed and Hussain (2011) identified inadequate disposal practices as key contributors to environmental degradation and urban pollution. Their analysis of waste types, quantities, and environmental factors highlighted the need for targeted interventions. Similarly, Chowdhury (2021) emphasized that waste is generally perceived as undesirable, highlighting the importance of timely and accountable services to ensure both employee responsibility and citizen satisfaction. Improvements across all phases—collection, transportation, final disposal, and recycling—require the application of scientific methods, stricter oversight of dumping sites, and efficient sorting techniques (Choudhury, 2021; Ristić, 2005).

Rapid urbanization in Bangladesh has significantly intensified waste generation. Islam (2021) reported that Dhaka currently produces 6,500 tons of solid waste daily, a figure projected to reach 8,500 tons by 2032, calling for comprehensive policy, structural, and procedural reforms. Consistent enforcement of regulations has been shown to enhance operational efficiency (Jerin et al., 2022; Marshall & Farahbakhsh, 2013). Mismanaged waste has far-reaching consequences, including environmental pollution, increased

public suffering, and heightened disease prevalence (Saha, 2013; Bakar et al., 2022). A case study by Ahmed and Quader (2011) in Narayanganj City exemplifies how inadequate waste management adversely impacts both the environment and public health, and provides actionable recommendations for improvement.

To mitigate such risks, Dewangan et al. (2022) advocated separating solid waste from air, water, and soil and promoting composting of biodegradable materials. Environmental health hazards are often directly linked to ineffective waste management, highlighting the necessity for systematic and comprehensive interventions (Ahmed & Huq-Hussain, 2013; Choudhury, 2021). Each stage of SWM, from generation to recycling, involves distinct procedures that require careful planning, monitoring, and execution to prevent detrimental outcomes (Talukder et al., 2021; Guerrero et al., 2013).

Previous studies have primarily focused on specific determinants of waste management and regional waste quantification. This research, however, seeks to address three central challenges in Bangladesh's SWM, clearly delineating its scope while proposing actionable solutions. Unlike earlier studies that relied predominantly on qualitative approaches, this study employs a mixed-methods design, combining qualitative and quantitative data with in-depth interviews. The objective is to identify key operational challenges within Narayanganj City Corporation, examine the underlying causes of inefficiencies, and assess the consequent impacts on residents.

Conceptualizing Solid Waste Management: A Process Perspective

Solid waste management is defined as the systematic process of collecting, segregating, treating, and ultimately disposing of solid wastes (Hoornweg and Bhada-Tata, 2012). An effective waste management system is characterized by the 4R principles: Reduce, Reuse, Recycle, and Recover, which collectively indicate a comprehensive approach to solid waste management (Marshall and Farahbakhsh, 2013). These principles address methods for minimizing waste generation, reusing materials, implementing recycling systems, and facilitating resource recovery (Guerrero et al., 2013). As previously noted, solid waste management requires a systematic approach that incorporates all stages from inception to completion (Dhokhikah and Trihadiningrum, 2012). Each stage is essential for effective system

management, and the omission of any component can result in mismanagement (Ashikuzzaman and Howlader, 2020). For instance, failure to deposit waste at designated dumping sites can lead to health risks and environmental pollution. Adherence to established protocols, such as using triple-layered paper during waste transfer, is also necessary. The following section presents a detailed discussion of the solid waste management process.

Fig 01: Procedures of solid waste management (Prepared by authors)

I. Waste Generation and Segregation

The first step in SWM involves identifying sources of waste and categorizing it into types such as organic, recyclable, and non-recyclable materials (Ahmed & Ali, 2004; Guerrero et al., 2013). Effective segregation at the household and industrial level reduces contamination, facilitates recycling, and minimizes environmental hazards (Ashikuzzaman & Howlader, 2020). Public awareness and education are critical at this stage, ensuring compliance with proper disposal practices (Guerrero et al., 2013; Adipah & Kwame, 2019).

II. *Waste Collection*

Waste collection is conducted through scheduled operations designed to cover all residential and commercial areas. It includes Door-to-door collection where personnel pick up segregated waste directly from premises, ensuring convenience and compliance and Community bin collection where shared bins are strategically placed in neighborhoods to facilitate bulk collection. Specialized vehicles equipped with compartments for different waste types are used to minimize cross-contamination during collection (Talukder et al., 2021). Efficient route planning, considering household

density, waste generation rates, and traffic patterns, ensures timely and comprehensive service coverage (Choudhury, 2021).

III. Waste Transportation

Collected waste is transported to intermediate transfer stations or directly to treatment facilities, depending on infrastructure availability. Transfer stations serve as consolidation points, enabling optimized transportation to final disposal or processing sites (Hoornweg & Bhada-Tata, 2012; Guerrero et al., 2013). Specialized vehicles ensure safe handling, reduce environmental impact, and prevent spillage or contamination.

IV. Waste Treatment and Processing

Treatment methods are selected based on waste characteristics, environmental standards, and technological capacity. Treatment involves reducing the volume and hazard potential of waste before final disposal. This includes Recycling, where materials such as plastics, metals, and paper are processed for reuse, Composting, for biodegradable waste, converting it into useful organic fertilizer (Dewangan et al., 2022), and Energy recovery**,** including waste-to-energy processes, where appropriate (Marshall & Farahbakhsh, 2013).

V. Waste Disposal

Final disposal occurs at designated landfills or engineered sites to prevent environmental contamination. Proper siting of disposal sites is critical to avoid degradation of soil, water, and surrounding ecosystems (Islam, 2021; Guerrero et al., 2013). Adherence to regulatory standards and established protocols, such as triple-layered waste handling, is essential to ensure environmental safety and public health.

VI. Monitoring, Enforcement, and Public Engagement

Continuous monitoring and law enforcement are integral to maintaining system efficiency. This includes Regular inspection of disposal sites and treatment facilities, enforcement of municipal laws to prevent illegal dumping, training programs for waste management personnel to enhance technical capacity and safety practices, and public education campaigns to raise awareness of proper disposal methods and environmental consequences of mismanagement (Ashikuzzaman & Howlader, 2020; Guerrero et al., 2013).

Effective Solid Waste Management: Towards an Analytical Framework

Based on the above discussion, effective waste management for our selected case, i.e. NCC hinges on selecting appropriate disposal sites, as poor site selection often leads to mismanagement and environmental harm. In this industrial hub, inadequate site designation, especially in low-lying areas, worsens environmental degradation. The availability of proper sites reflects management quality. However, the lack of staff training and public awareness remains a key obstacle. To address this, targeted training and public education are crucial for building operational capacity and reducing public health risks, such as increased diseases like dengue, underscoring the urgent need for better waste management and community engagement. Robust regulatory enforcement is the foundation of effective waste management in NCC. Ensuring strict legal compliance from residents and employees underpins adherence to procedures. Citizen forums and participation with the city corporation foster accountability and enable feedback. Consistent collection and recycling initiatives further drive systematic, sustainable outcomes highlighting that collective action and strong oversight are central to achieving efficient waste management (Hoornweg & Bhada-Tata, 2012; Marshall & Farahbakhsh, 2013).

To analyze these issues, we conducted a regression model in which solid waste management was treated as the dependent variable, while other key influencing factors were considered as independent variables (See Figure 02).

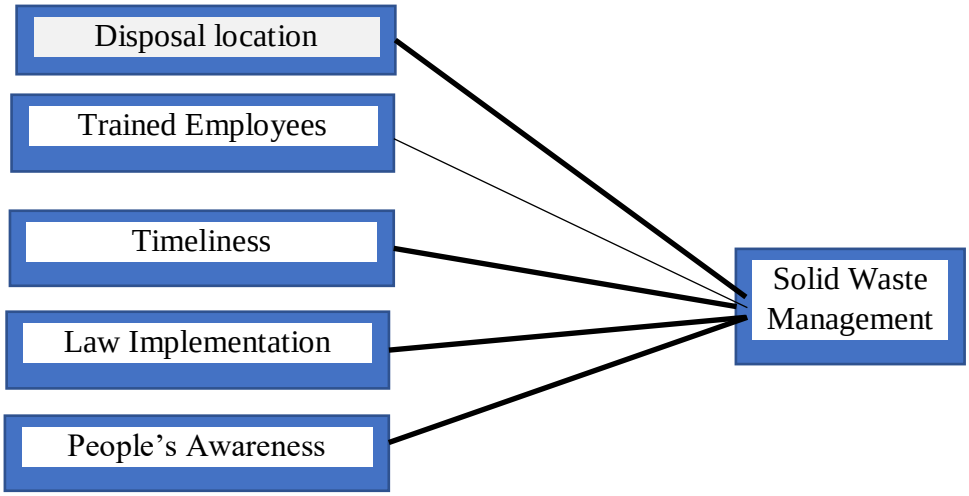

Fig 02: Analytical Framework for understanding factors influencing solid waste management

Now, $SWM = \alpha + \beta_1 DL + \beta_2 TRAIN + \beta_3 TIME + \beta_4 LAW + \beta_5 PEOP + e$

Here,

α = Intercept, SWM= Solid Waste Management, DL= Disposal Location, TRAIN= Trained Employees, TIME= Timeliness, LAW= Law Implementation, PEOP= People's Awareness

Methodology

The overarching objective of this study **is** to identify the challenges associated with solid waste management (SWM) at Narayanganj City Corporation (NCC). Specifically, the study seeks to elucidate the procedures of solid waste management implemented by Narayanganj City Corporation, examine the challenges experienced by residents in areas affected by inadequate waste management, assess the efficacy of existing initiatives undertaken by Narayanganj City Corporation to improve SWM.

To address these objectives, the study adopts a mixed-methods approach, integrating both qualitative and quantitative research methodologies. Qualitative data are collected through focus group discussions (FGDs), direct observation, in-depth interviews (IDIs), and key informant interviews (KIIs). Quantitative data are obtained via a structured survey administered to residents of Narayanganj. Both primary and secondary sources are utilized, with primary data collected directly from the target population and secondary data drawn from NCC statistics, peer-reviewed articles, journals, books, e-resources, newspapers, and other scholarly publications.

A total of 138 participants were surveyed using statistical sampling techniques. From this group, 15 to 20 individuals were selected for in-depth interviews (IDIs) through convenience sampling to provide supplementary qualitative insights. Two focus group discussions (FGDs) (See Table 01) were conducted: the first included 8 to 10 service providers from Narayanganj City Corporation and lasted 30–35 minutes, while the second involved 7 to 10 participants, including vendors, drivers, and other stakeholders, and lasted 20–25 minutes.

FGD No.	Participants	Duration
1	8–10 NCC service providers	30–35 minutes
2	7–10 stakeholders (vendors, drivers, other personnel)	20–25 minutes

Table 01: An Overview of Focus Group Discussions (FGDs)

The survey encompassed three administrative areas of Narayanganj City Corporation: *Shiddhirganj* (Wards 1–9), *Narayanganj* (Wards 10–18), and *Kadamrasul* (Wards 19–27), all of which fall under the corporation's responsibility for solid waste management. Additionally, eight Key Informant Interviews (KIIs) were conducted with relevant authorities, including the Town Planner, Head of the Solid Waste Management Department, a junior officer, and community leaders. Data were collected between September and October 2023. The main questionnaire comprised seven sections, including socio-demographic variables, and employed a five-point Likert scale. A checklist was utilized to guide the collection of information from key informants. Data collection methods included structured questionnaires, interviews, and direct observations, with respondents categorized as either service providers or service recipients. Quantitative data were entered and analyzed using STATA, including regression analysis of the dependent and independent variables. The study included only residents of Narayanganj City Corporation. Informed consent was obtained from all participants, ensuring adherence to ethical research standards.

Result

Descriptive statistics of respondents' compendium

Understanding the socio-demographic characteristics of respondents is crucial for contextualizing the findings related to solid waste management practices in Narayanganj City Corporation. Effective waste management depends not only on infrastructure and policy but also on citizen engagement, which is influenced by factors such as age, gender, education, occupation, and income. The present study surveyed a diverse sample to capture these variations comprehensively. The socio-demographic data (See Table 02) reveal a diverse sample, capturing variations in gender, age, area, occupation, education, and income, which are crucial for understanding participation in solid waste management activities. Female respondents slightly outnumber males (52.2% vs. 47.8%), reflecting higher engagement among women in the

surveyed areas. In terms of age, the largest group of respondents is 18–24 years (42.8%), indicating that young adults represent the primary demographic engaged in or affected by waste management initiatives. The smallest age group is below 18 (5.8%), while participants above 40 constitute 8.7%. Geographically, most participants reside in Narayanganj (40.3%), followed by *Shiddhirganj* (36.7%) and *Kadamrasul* (23%), which aligns with the administrative coverage of Narayanganj City Corporation. Occupation-wise, students dominate the sample (55.6%), while laborers are least represented (6.3%). This occupational profile also explains the income distribution: a majority of respondents (65.2%) earn less than TK 10,000, and only a few exceed TK 50,000. Regarding educational attainment, nearly half of the respondents (46%) have completed degree-level or higher education, while a small proportion have no formal education (6.5%). Other education levels are distributed across certificates, high school, secondary, primary, and diploma holders.

Table 02: Descriptive statistics of respondents' profile

Variable	**Category**	**Frequency (%)**	**Variable**	**Category**	**Frequency (%)**
Gender	Male	47.8	Occupation	Student	55.6
	Female	52.2		Professional	21.8
Age	Below 18	5.8		Labor	6.3
	18–24	42.8		Unemployed	7.7
	25–30	26.1		Others	8.6
	31–35	8.0	Education	Degree/Higher	46.0
	35–40	8.7		Diploma	4.3
	Above 40	8.7		Certificate	15.1
Area	Narayanganj	40.3		High school	14.4
	Shiddhirganj	36.7		Secondary	7.9
	Kadamrasul	23.0		Primary	5.8
Monthly Income (TK)	Less than 10,000	65.2		Never attended	6.5
	11,000–20,000	19.6			
	21,000–30,000	6.5			
	30,000–50,000	5.1			
	Above 50,000	3.6			

Overall, the descriptive statistics highlight that the study captures a representative cross-section of residents, including young adults, women, students, and individuals with varying education and income levels. This diversity ensures that subsequent analyses of solid waste management challenges reflect the perspectives of all key stakeholders in Narayanganj City Corporation.

Correlation Analysis of Solid Waste Management

The correlation analysis reveals several notable associations between solid waste management and its independent determinants, as well as among the independent variables themselves. By definition, the correlation of each variable with itself equals 1.0000.

Variable	SWM	DL	TRAIN	TIME	LAW	PEOP
SWM	1.0000					
DL	0.3883**	1.0000				
TRAIN	0.3099**	0.3923**	1.000			
TIME	0.3250**	0.2972**	0.5486**	1.0000		
LAW	0.0409	-0.1405	0.0538	0.0059	1.0000	
PEOP	0.2012**	0.2673**	0.5805**	0.5165**	0.0470	1.0000

** The correlation holds significance at the 0.05 level.*
*** The correlation holds significance at the 0.01 level*

Table 03: Correlation Analysis of Solid Waste Management

The correlation analysis (See Table 03) reveals several notable associations between solid waste management and its independent determinants, as well as among the independent variables themselves. By definition, the correlation of each variable with itself equals 1.0000. The findings indicate that **disposal location (DL, r = 0.3883), trained employees (TRAIN, r = 0.3099), timeliness (TIME, r = 0.3250), and public awareness (PEOP, r = 0.2012)** are significantly correlated with solid waste management at the 0.05 level, highlighting their critical roles in shaping SWM effectiveness. In contrast, law implementation (LAW, r = 0.0409) shows a

weak, non-significant association with SWM, suggesting that legal enforcement alone may not strongly influence management outcomes in this context. Interrelationships among independent variables are also evident**. TRAIN (r = 0.3923), TIME (r = 0.2972), and PEOP (r = 0.2673)** are significantly correlated with disposal location, while **TIME (r = 0.5486) and PEOP (r = 0.5805)** show strong associations with trained employees. Additionally, public awareness demonstrates a meaningful correlation with timeliness (r = 0.5165), indicating that informed citizens contribute to more efficient and punctual waste management operations.

Test of Multicollinearity of independent variables

Before performing regression analysis, it is essential to ensure that the independent variables do not exhibit high intercorrelations, which can compromise the reliability of the model. To assess this, a multicollinearity test was conducted using the **Variance Inflation Factor (VIF)** for each independent variable.

Variable	**VIF**
DL	1.23
TRAIN	1.86
TIME	1.58
LAW	1.04
PEOP	1.65

Table 04: Test of Multicollinearity of independent variables

The results (See Table 04) indicate that all VIF values are well below the critical threshold of 10, which signifies that multicollinearity is not present among the independent variables. Values between 5 and 10 may suggest potential multicollinearity, while values exceeding 10 indicate a serious concern; however, the observed VIFs confirm that each independent variable; disposal location (DL), trained employees (TRAIN), timeliness (TIME), law implementation (LAW), and public awareness (PEOP); contributes uniquely to the regression model. Therefore, the regression estimates can be interpreted confidently without bias arising from multicollinearity.

Multivariate Analysis of Solid Waste Management.

To identify the key determinants of solid waste management in Narayanganj City Corporation, a multivariate regression model was employed. This model examined the influence of independent variables—disposal location, trained employees, timeliness, law implementation, and public awareness—on solid waste management. The analysis aimed to quantify the strength and significance of these relationships, providing a rigorous basis for understanding operational and managerial challenges.

SWM	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
DL	.300768	.0823844	3.65	0.000**	.1378036	.4637325
TRAIN	.0789477	.0828983	0.95	0.343	-.0850334	.2429287
TIME	.1578197	.0760402	2.08	0.040*	.0074046	.3082347
LAW	.0358412	.0349617	1.03	0.307	-.0333165	.104999
PEOP	-.0402169	0819167	-0.49	0.624	-.2022563	.1218225

Number of obs = 138
F (5, 132) = 7.09
Prob > F = 0.0000
R-squared = 0.2118
Adj R-squared = 0.1819
*At 5% significant level (P≤ 0.05)
**At 1% significant level (P≤ 0.01)

Figure 05: Multivariate Analysis of Solid Waste Management

The primary correlation analysis (See Table 05) revealed that only two variables, disposal location (DL, p = 0.000) and timeliness (TIME, p = 0.040), demonstrated significant associations at the $P \leq 0.01$ and $P \leq 0.05$ levels, respectively. The coefficient for disposal location is 0.300768 at a 95% confidence interval, while the coefficient for timeliness is 0.1578197 at a 99% confidence interval. The p-values for the remaining variables were not significant. The R-squared value of 0.2118 indicates that the independent variables explain approximately 21.18% of the variation in reporting challenges.

Disposal location emerged as a critical variable in identifying the challenges of solid waste management in NCC. Inadequate and insufficient disposal sites, along with limited resources, may contribute to

mismanagement. The regression analysis indicated a positive association, with a coefficient of 0.300768 and a p-value of 0.000, which is significant at the 1% level. Therefore, the null hypothesis (H01: There is no significant correlation between solid waste and disposal location) is rejected, and the alternative hypothesis is accepted.

Trained employees also showed a positive coefficient; however, the p-value was not significant (0.343), leading to acceptance of the second hypothesis (H02: There is no significant correlation between solid waste and trained employees). The coefficient for timeliness was 0.1578197, with a p-value of 0.040, significant at $P \leq 0.05$, resulting in rejection of the third null hypothesis (H03: There is no significant correlation between solid waste and timeliness) and acceptance of the alternative. Law implementation had a coefficient of 0.0358412, but the p-value was not significant (0.347), so the fourth hypothesis (H04: There is no significant correlation between solid waste and law implementation) is accepted. The association between solid waste management and people's awareness was negative and insignificant, with a p-value of 0.624 and a coefficient of -0.0402169, leading to acceptance of the fifth hypothesis (H05: There is no significant correlation between solid waste and people's awareness).

Discussion

As mentioned earlier, qualitative data was collected through key informant interviews with individuals involved in solid waste management. Two focus group discussions (FGDs) were conducted at the Al-Amin Nagar Sanitary Landfill (Ward 18, NCC). The first FGD involved service providers, while the second included an excavator driver and waste collectors focused on specific waste reduction. The first discussion lasted approximately 30 to 35 minutes and included 8 to 10 service providers, all of whom were waste collectors. The second discussion lasted 25 to 30 minutes and involved 7 to 10 participants, including two excavator drivers and three waste vendors.

Non-governmental organizations (NGOs) and the Community Development Cluster (CDC) are responsible for collecting household waste. These organizations apply to the city corporation for permission to operate, after which city officials, including the relevant ward commissioner, review the applications. Among the applicants, one organization is selected to assume responsibility. The selected organization is required to deposit a mortgage of 1,00,000 TK and must renew this arrangement annually. If the

organization fails to perform adequately, the city corporation may deduct charges from the deposit or deny renewal for the following year.

Employees are either affiliated with NGOs or the Community Development Cluster (CDC). Both types of organizations seek permission from the city corporation and subsequently hire waste collectors. Annual renewal of their activities is required, subject to a nominal fee. All current service providers are male; no women are employed in these roles. According to the junior town planner, solid waste management in the Narayanganj City Corporation (NCC) is conducted through three primary processes such as Collection of waste, Transportation, and Final disposal.

A waste collector reported that waste from the Narayanganj and *Shiddhirganj* areas is disposed of at this dumping site. Some van drivers deposit waste at the *Jalkuri* dumping area, although it is designated for the union. Waste from *Kadamrasul* is transported to the Bandar Dumping Site. An employee of the waste collection team shared the following experience:

> *"Some women are aggressive and they do not want to provide their waste to the waste collector for the charge. As a result, it is his challenge. If any member of the city corporation walks that filthy area, he has to be accountable for this mismanagement."*

After the initial collection process, waste is transferred to groups responsible for segregation and sale. One participant described the system: waste collectors first sell waste at 25 TK per kilogram to women working near the dumping site. The waste is then sorted by quality and sold to three vendors, who subsequently sell it to various mills for recycling. According to the excavator driver, no significant problems are encountered, as workers have adapted to the environment and reside near the dumping site.

The junior town planner of NCC reported that the *Panchoboti* Compost Plant produces 22 tons of composted fertilizer per day on a one-acre site. The Clean Officer of NCC, Head of the Department of Solid Waste Management, stated that the city covers approximately 72.43 square kilometers and generates 1,000 tons of waste annually. Each resident produces an average of

0.56 kilograms of waste per day. Various types of waste are generated, with solid waste being one category.

The Clean Officer further noted that there are six dumping sites within Narayanganj City Corporation: *Panchoboti* Compost Plant, *Jalkuri* Dumping Site, *Jalkuri* Landfill (Extension), Al-Amin Nagar Sanitary Landfill, Bandar New Dumping Site, and Saidpur Dump Site. Of these, the Saidpur Dump Site is temporary.

The junior town planner of Narayanganj City Corporation (NCC) provided an overview of human resources. NCC operates 25 dumping vehicles and employs 31 truck drivers. The Clean Officer stated that NCC does not employ direct housing waste collectors. However, 1,135 road cleaners work from 6:00 to 10:00 a.m. A waste collector described their daily activities as follows:

> *"They have only one holiday. They do not work on Friday. If a worker misses a day, they must compensate by working more on Saturday, which doubles the workload."*

Another participant in the discussion stated:

> *"Without working regularly, I cannot maintain stability. It is my duty to clean the city. I take two holidays during Eid. I strive to work efficiently. I collect 100 to 120 units per house, but I always encourage all citizens to provide their waste, even if they pay only 50 TK. I never discourage anyone. If a resident does not provide their waste, it becomes my responsibility to address the challenge. I consistently aim to keep my ward clean."*

Another service provider discussed income and expenditure, noting that earnings are received directly from service recipients. After paying necessary charges, the remaining income can be saved. Another participant commented that the working hours are relatively short, with collection and dumping activities scheduled from 6:00 to 10:00 a.m., after which workers return home. A waste collector reported that earnings increase significantly during Eid and Puja holidays, and expressed satisfaction with the work. One

collector manages waste from 250 to 300 households and receives an average of 100 TK per month.

The town planner of NCC reported that Narayanganj City Corporation operates efficiently. However, the Solid Waste Management Policy 2021 has not yet been implemented. This policy aims to ensure waste is collected in three separate bins at the source and to enforce regulations against disposing of waste in drains. Its effectiveness will be evaluated following implementation. NCC currently operates under the Local Government Act 2009 and is working to achieve Sustainable Development Goal 11.6 by advancing waste management practices. Organic fertilizers are produced through aerobic decomposition; if not recycled regularly, methane (CH4), a greenhouse gas 26 times more potent than carbon dioxide (CO2), is generated. In addition to the Local Government Act 2009, NCC follows the National 3R Strategy 2010 and the Biomedical Waste Management Rule 2008 for medical waste.

An inspector from Ward 1 noted that the current counselor is effective and that mosquito control measures are regularly implemented. The city corporation deploys two teams, Team A and Team B, to inspect waste management across different areas daily. Public awareness is promoted through regular engagement, such as encouraging shopkeepers not to dispose of waste between 6:00 a.m. and 8:00 p.m. and to use bins provided at minimal cost. Shopkeepers are required to store waste until collection each morning. A significant challenge remains with hawkers who contribute to environmental pollution. Additionally, approximately 200,000 to 250,000 non-residents travel daily from *Bandar* to *Sadar*, exacerbating waste management issues. At the *Panchoboti* Compost Plant, organic waste is processed into compost. The recent 'Waste to Energy' project in *Jalkuri* is a notable initiative. Sheikh Rasel Nagar Park, previously inactive, has been renovated to align with eco-friendly standards, earning recognition from the Chinese government. Similarly, the Malta government recognized NCC for improvements at *Shiddhirganj* Lake Park. Upcoming projects include establishing a shop adjacent to the city corporation to purchase plastics from citizens, which will then be used to produce eco-friendly fruit baskets and plastic ropes. The junior town planner indicated that a report on NCC has been submitted to the World Bank. According to the Clean Officer, a project in *Jalkuri*, in partnership with a Korean group, will process 600 tons of waste

daily to generate 6 MW of electricity. The 'Waste to Recycle' facility is located in *Dashergaon* (Ward 25).

Unpacking the Conundrums of Solid Waste Management

Despite several successful initiatives, the city corporation continues to encounter significant challenges in managing solid waste effectively. The Statistics Department of Narayanganj City Corporation reports the existence of only six landfills, two of which are still under development. These facilities are insufficient to accommodate waste generated across the city's extensive area. According to a junior cleaning officer, the corporation employs only one town planner, which is inadequate for comprehensive urban planning. In comparison, the Dhaka City Corporation reportedly employs seven or more planners, highlighting a resource gap. The Local Government Act of 2011 mandates strict enforcement, stipulating fines of up to 50,000 TK for violations of environmental regulations. The junior cleaning officer further recommended that government efforts should address not only specific localities but the entirety of Bangladesh, as sustainable development requires an integrated national approach. Additionally, the introduction of a reward system for reducing carbon dioxide emissions was suggested. Improper solid waste management leads to serious public health consequences, including outbreaks of cholera, hepatitis, typhoid, polio, and dengue. While legislation alone may not alter public attitudes, effective enforcement can mitigate mismanagement. A critical challenge identified is the inability to deliver medicines to rooftops with gardens, where stagnant water can accumulate and facilitate the breeding of *Aedes* mosquitoes. An inspector reported that vaccines for cancer (for girls aged 9 to 14), hepatitis, and other diseases are provided, but emphasized the need for comprehensive guidelines and promotion of personal hygiene among citizens. Many residents do not dispose of waste properly, often dumping it near their homes, which degrades the environment. Nevertheless, it was noted that sanitation workers generally fulfill their duties effectively. It was recommended that the city corporation should first identify key issues before implementing solutions. Conversely, new members participating in the focus group discussion reported no significant challenges in waste management, stating that operations proceed smoothly. Although initial adjustment to the environment posed difficulties, these were overcome over time. Persistent challenges include lack of strategic management, insufficient expertise, limited resources, inadequate budget,

rapid urbanization, shortage of qualified personnel, and restricted discretionary authority.

Conclusion

Key Findings and Contributions

The present study sought to identify challenges in effective solid waste management by examining operational processes, causes of mismanagement, and resulting consequences. Quantitative analysis revealed a statistically significant relationship between management effectiveness and both disposal location (p-value = 0.000, 99% confidence) and timeliness (p-value = 0.040, 95% confidence). Qualitative findings identified challenges such as insufficient awareness and lack of public interest. Effective solid waste management is critical for environmental protection and necessitates a holistic approach that integrates environmental, social, and cultural considerations. These interconnected dimensions are constrained by factors such as limited budgets and adverse health impacts. The local government allocates only 8% of total expenditure to solid waste management (BBS, 2022), amounting to 2,260 crores in 2020-21, which restricts operational effectiveness. Enhanced community engagement, in conjunction with government initiatives, is required to improve outcomes.

The findings indicate that both employees and citizens play essential roles in effective solid waste management. Prioritizing environmental and public health concerns is necessary. Workers require adequate training and clear operational guidelines, while citizens must adhere to environmental regulations and Local Government Engineering Department (LGED) procedures. By identifying key challenges and presenting statistical evidence, this study seeks to increase public awareness of the significant health risks associated with mismanaged waste.

Implications of Study and Future Scope of Research

These findings will assist the Narayanganj City Corporation in understanding current citizen perceptions. The implications are categorized into three primary areas.

First, policymakers can utilize these findings to evaluate the sector's limited progress and identify existing constraints. Despite the presence of relevant laws, stakeholders have not achieved the desired outcomes, and this study highlights ongoing challenges. Second, the study provides an objective and scientific assessment, which may benefit students, authors, and professionals seeking to expand their knowledge. Finally, future researchers can reference this study in their literature reviews.

In conclusion, the study's triangulated perspectives underscore the shared responsibility of service providers and citizens, particularly in the context of limited funding and inadequate services. To enhance solid waste management, authorities should maintain consistent oversight and engage in ongoing dialogue with citizens to assess service quality. Such collaboration strengthens accountability and raises awareness of health risks associated with improper waste practices. Solid waste management remains essential to public health and environmental sustainability, necessitating active participation from all stakeholders.

While the findings from our study are valuable, we acknowledge that it is constrained by a cross-sectional research design and reliance on a single case study. Therefore, future research should employ multi-case study methods encompassing broader geographic areas to allow cross-case comparisons for testing the validity of our findings.

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