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Sustainable urban development in Dhaka through the lens of smart city initiatives: a policy implementation analysis of MRT Line 6 and the a2i e-governance program

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Sustainable Urban Development in Dhaka Through the Lens of Smart City Initiatives: A Policy Implementation Analysis of MRT Line 6 and the a2i E-Governance Programme

A thesis submitted in partial fulfilment of the requirements for the degree of
Master in Development Studies

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August, 2026

Declaration

I hereby declare that this thesis, titled **"Sustainable Urban Development in Dhaka Through the Lens of Smart City Initiatives: A Policy Implementation Analysis of MRT Line 6 and the a2i E-Governance Programme,"** is my own work and has been prepared as part of the requirements for the Master's degree in Development Studies at Independent University, Bangladesh (IUB).

To the best of my knowledge, this thesis has not been submitted, either in whole or in part, for any other degree or academic qualification. All sources of information, ideas, and materials used in this study have been appropriately acknowledged and referenced.

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Approval

This thesis titled **"Sustainable Urban Development in Dhaka Through the Lens of Smart City Initiatives: A Policy Implementation Analysis of MRT Line 6 and the a2i E-Governance Programme,"** prepared by Mafruha Binte Shameem, ID: 2522021, has been accepted as satisfactory in partial fulfillment of the requirements for the Master's degree in Development Studies at Independent University, Bangladesh (IUB).

_____

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Abstract

As Bangladesh's leading economic and governance hub, Dhaka has embraced “smart city” development as a way to cope with its fast-growing population, heavy traffic congestion and poor public service provision. Two flagship interventions define this effort: the Mass Rapid Transit Line 6 (MRT-6), the first metro rail in Bangladesh, and Aspire to Innovate (a2i), the country’s e-governance project. While both projects have attracted policy focus and funding, there is no study that provides an overall evaluation, based on specific indicators, of whether these two initiatives are helping Dhaka achieve sustainable urban development and, or where the underlying policy and implementation gaps lie

To address this gap, the paper uses an explanatory-evaluative case study approach using exclusively secondary data, including government and project documents, reports by international agencies, scholarly literature, statistics, and news articles published between 2019 and 2024. Three methods are used to analyze the data: policy coherence analysis that checks the alignment of the projects with SDG 11 and the New Urban Agenda; a composite indicator system that evaluates how the projects are performing on achieving sustainable development in Dhaka based on a few of the indicators of SDG 11 and ISO 37122:2019 on a 1–5 scale; and an implementation gap analysis that identifies types of gaps between intended goals and actual performance as resource gap, coordination gap, monitoring gap and policy design gap.

It appears that both projects have had significant impact on Dhaka’s smart city development, however they are not completely sustainable. While MRT-6 performs well in terms of travel time reduction and ridership increase, there is very little evidence on whether fares are affordable, how last mile connectivity works, and what is the modal shift in the city. And while a2i is responsible for the higher number of digital services in Dhaka, there is very little evidence on whether the digital services are accessible or adopted, particularly whether they are accessible to all across income, gender and settlements in Dhaka. For the 12 indicators that were measured numerically, the overall average score is around 3 out of 5, indicating good progress in infrastructural development and digital services provision but institutional coordination, monitoring and evaluation challenges. In other words, the research reveals that technology investments alone do not lead to sustainable urban development and thus coordinated governance, monitoring with disaggregated data and equity must also be considered. The results can also inform future efforts in improving coordination among relevant agencies, strengthening monitoring of project outcomes, and focusing on affordability and accessibility for residents in Dhaka and other cities in Bangladesh

Keywords: smart city, sustainable urban development, Dhaka, MRT-6, a2i, policy coherence, composite indicators, SDG 11, New Urban Agenda, ISO 37122

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List of Abbreviations

Abbreviation	Full Form
a2i	Aspire to Innovate
ADB	Asian Development Bank
BBS	Bangladesh Bureau of Statistics
BSS	Bangladesh Sangbad Sangstha
BUET	Bangladesh University of Engineering and Technology
ARI	Accident Research Institute, BUET
CDIA	Cities Development Initiative for Asia
DMTCL	Dhaka Mass Transit Company Limited
DNCC	Dhaka North City Corporation
DSCC	Dhaka South City Corporation
DTCA	Dhaka Transport Coordination Authority
GDP	Gross Domestic Product
GHG	Greenhouse Gas
ICT	Information and Communication Technology
ISO	International Organization for Standardization
JICA	Japan International Cooperation Agency
M&E	Monitoring and Evaluation
MoU	Memorandum of Understanding
MRT-6	Mass Rapid Transit Line 6
NE	Not Evaluated
NMT	Non-Motorised Transport
NUA	New Urban Agenda
RSTP	Revised Strategic Transport Plan
SDG	Sustainable Development Goal
TBS	The Business Standard
UNDP	United Nations Development Programme
UN-Habitat	United Nations Human Settlements Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Dhaka serves as the political, administrative and economic hub of Bangladesh; however, it is also one of the most densely populated and highly pressurized cities in the country. While the city attracts large population, employment and economic activities, its transportation system, public utilities and institutions cannot cope up with the demand of people. Dhaka contributes roughly 20% of the national GDP and accounts for nearly half of all formal sector employment in the country (World Bank, 2022). Because of its significant role in the national economy, problems of traffic congestion, inadequate service provision and environmental degradation in Dhaka have consequences beyond the metropolitan area.

This pressure is also reflected in heavy traffic congestion. Commuting in Dhaka is time-consuming and unreliable, raising the costs of doing business and limiting the time that individuals can devote to productive activities such as work, study, caring for loved ones, and leisure. The World Bank (2022) notes that efficient cities and greater connectivity are necessary for Bangladesh to achieve its economic growth ambitions. But for residents, the impact of these issues goes beyond the economy, as it disrupts daily life, degrades air quality, leads to physical fatigue, and lowers the overall standard of living.

To address this, the smart city concept has been embraced by the Government of Bangladesh in its development strategies. The Eighth Five-Year Plan (2020–2025) and Vision 2041 highlight the need for digital governance, ICT-driven public service provision, and more sophisticated urban management (BSS News, 2022; Government of Bangladesh, 2020). Smart city development, therefore, is framed not only as a technological undertaking, but as a strategy to increase mobility, optimize service provision, foster environmental sustainability, and build citizen participation. This approach is necessary because, for cities to be sustainable, they must be equitable, environmentally conscious, and well governed as well as having the right physical infrastructure.

Two such programs will serve as focal points in this study. One is Mass Rapid Transit Line 6 (MRT-6), the nation's first urban metro line, which was prioritized in Dhaka's transport master plan and was funded largely by the Japan International Cooperation Agency (JICA, 2022). The other is Aspire to Innovate (a2i), a government program that has promoted e-governance and built assistive-use Digital Centers across the country (UNDP Bangladesh,

2020; Digital Centre, n.d.). While these two projects have different foci, both aim to reduce the costs associated with living in Dhaka by providing commuters with faster transport and citizens with better access to public services.

In this study, the cases of MRT-6 and the a2i e-governance program are used to explore smart city development in Dhaka. MRT-6 represents smart transport, and a2i represents smart public service delivery. Using these two examples, I will evaluate whether smart city policies are leading to sustainable development gains, and identify areas where policy and implementation need to be improved.

1.2 Smart City Concept and Sustainable Urban Development Context

The term "smart city" is commonly used to refer to urban areas that use information and communications technologies, data analytics and networked governance to deliver improved urban services and quality of life. According to Caragliu, Del Bo and Nijkamp (2011), smart cities are urban settings where investments in human and social capital, traditional infrastructure and contemporary ICT enable sustainable economic growth and enhance quality of life through participatory governance. This definition is useful because technology is not a goal in itself, but rather, technology is only good if it enhances the quality of people's everyday lives.

Another element of the concept of smart city is its own criticisms. Hollands (2008) argues that smart city initiatives can become technocratic if they are driven primarily by the desire to brand the city, to serve the interests of business, and to advance technology at the cost of concerns like inequality, democratic participation, and social justice. This criticism is highly relevant to the context of Dhaka. For instance, while the metro rail system may help to reduce travel times for those who ride it, it may not necessarily benefit low-income workers if the fares are high or if there are no ways of getting from the metro station to their workplace. Similarly, while digital public services may help to reduce queue times for those who have internet access, they are of little value to those who do not have access to smartphones, lack digital literacy, or do not have access to stable internet.

Therefore, this study adopts sustainable urban development as the main anchor for the concept of smart city. That is, the study does not simply view smart cities as improving

economic efficiency, but also as providing equitable access to public services, affordable and safe mobility, environmental protection, and accountable public institutions.

Sustainable Development Goal 11 calls for "inclusive, safe, resilient and sustainable cities," including targets for public transport, planning and the environment (United Nations, 2015). The International Organization for Standardization's (ISO) ISO 37122:2019 standard for smart cities contains indicators for transportation, governance, environment, and society (International Organization for Standardization [ISO], 2019). These conceptual references provide the study with the basis for analyzing the MRT-6 and a2i programmes in terms of sustainable development.

1.3 Policy Context and Study Rationale

Bangladesh's smart city strategy is part of a web of related policy initiatives. Digital Bangladesh initiated the push to utilize ICT in public service delivery, and Vision 2041 and the 8th Five-Year Plan expanded this initiative to encompass a future more sophisticated, knowledge-based, and equitable society (Government of Bangladesh, 2020). The government's commitment to create a 'Smart City, Smart Village' by 2041 reflects the ambition to link the digital shift with spatial planning in the national context (BSS News, 2022).

MRT-6 and a2i both work within this policy context, yet they address different challenges. The MRT-6 seeks to remedy the city's lack of efficient transport options through the introduction of a high-capacity mode of transit to a metropolis dependent upon buses, private vehicles, rickshaws, and unlicensed transport services. The a2i programme, on the other hand, addresses the inefficiency of the public sector system by expanding e-service delivery channels. In general, both projects aim to reduce the cost of urban life, MRT-6 by lowering commuting time, a2i by reducing bureaucratic red tape.

Yet policy aims may not necessarily translate into sustainable development. A smart city project can deliver on infrastructure targets or launch a novel service and yet underachieve on issues such as inclusiveness, coordination, or transparency. A transportation system can be constructed according to technical standards and yet fail to function if there is no connecting transit network, stations are difficult to reach, or fares are too expensive. A

website for e-governance may offer many services yet exclude citizens who lack access to technology, are illiterate in using technology, or distrust digital systems. These examples illustrate why evaluation is important.

1.4 Statement of the Problem

This study focuses on a critical gap in the existing literature: There is currently no composite, indicator-based evaluation of Dhaka's flagship smart city initiatives. While both the MRT-6 and the a2i have received significant policy attention and financial investment, no holistic evaluation of their contribution to sustainable urban development exists. The available information on these projects is siloed: the transport literature discusses the number of passengers, travel time savings, and user satisfaction; meanwhile, the digital governance literature presents data on e-service uptake and system expansion. These separate reports do not shed light on whether the two initiatives combined contribute to making Dhaka a more sustainable urban space.

Another challenge is institutional fragmentation. Several institutions are involved in managing Dhaka's smart city development, including Dhaka Mass Transit Company Limited (DMTCL), Dhaka Transport Coordination Authority (DTCA), Dhaka North City Corporation (DNCC), Dhaka South City Corporation (DSCC), and the Information and Communication Technology (ICT) Division. According to Karmaker et al. (2023), governance and institutional capacity remain significant barriers to implementing smart city projects in Dhaka, while Hossain, Haque, and Ullah (2024) show that Bangladesh's city corporations have yet to achieve robust policy evaluation and sustainable urban governance. It seems the problem is thus not only technical or economic, but also institutional.

Current evidence suggests high demand for MRT-6 travel. Yet the ridership figures cannot reveal whether the system is affordable, environmentally sustainable, effectively interlinked with other transport networks, or reduces traffic congestion throughout Dhaka. Similarly, while a2i has expanded access to digital public services, there remains limited consistent data from Dhaka about its adoption across populations with varying demographic characteristics such as gender, income, and settlement. This study seeks to address this data gap.

1.5 Research Question

The research question that this study seeks to answer is:

1. To what extent do MRT Line 6 and the a2i e-governance programme contribute to sustainable urban development in Dhaka?
2. What policy and implementation gaps constrain the effectiveness of MRT Line 6 and the a2i e-governance programme in contributing to sustainable urban development in Dhaka?

1.6 Research Objectives

The research questions are answered through three research objectives:

1. To review the policy frameworks governing MRT-6 and a2i and assess their coherence and alignment with SDG 11 and the New Urban Agenda.
2. To evaluate the implementation performance of MRT-6 and a2i against a composite set of sustainability indicators covering the period 2019–2024.
3. To identify policy and implementation gaps and formulate evidence-based recommendations for improving sustainability outcomes in Dhaka.

1.7 Significance of the Study

This study holds significance for the following three reasons. First, it links smart city development to the issues of concern in Development Studies. While many studies on smart cities emphasize technology, infrastructure and efficiency, this study maintains the relevance of these topics while additionally exploring the question of who benefits and who may be left behind, and how to make institutions accountable. Thus, this study approaches smart urban development as an issue of human development and equity rather than just a technical project.

Second, this study has practical relevance for policy and planning. As Bangladesh is currently planning and implementing smart city related projects outside Dhaka, including through the Bangladesh Smart Cities Development Project under the ADB-CDIA (CDIA, 2024), insights from the experience of MRT-6 and a2i could help guide policy decisions

about which institutional frameworks, indicators and equity measures are necessary to replicate these types of models in other cities.

Third, this study makes a methodological contribution by employing a composite sustainability indicator approach adapted for the Dhaka case. By integrating policy coherence analysis, indicator scoring and implementation gap analysis, the study provides a workable method for assessing the performance of smart cities even in contexts when primary data collection is not possible, which is highly relevant given that in Dhaka there is data available but not readily accessible.

1.8 Scope of the Study

The study is geographically restricted to the Dhaka Metropolitan Area, and thematically to two projects: the MRT Line 6 project and the a2i e-governance programme. The study evaluates performance over the period 2019 to 2024, although some post-2024 operational data are used where it helps clarify trends in implementation.

The study does not cover all smart city projects in Bangladesh; rather it considers one transport project and one digital governance project, in order to conduct a focused cross-sector analysis. The study utilizes secondary sources only, including government documents, project reports, city corporation reports, publications from international organizations, academic journals, statistical datasets and news sources.

The lack of primary data means the study cannot directly capture experiences at the individual household level, which is a particular concern in relation to informal settlements, women's access to digital technologies and the experiences of low-income commuters.

1.9 Thesis Structure

The thesis comprises five chapters. The first chapter presents the introduction, including the background to the study, the problem statement, research question, objectives, significance of the study and scope of the study.

The second chapter is the literature review, covering literature on smart cities, sustainable urban development, smart mobility, e-governance, institutional coordination and implementation, and formulating the theoretical and conceptual framework of the study.

The third chapter presents the research methods employed in this study; specifically, the secondary data research design, policy coherence analysis, composite indicator scoring, and implementation gap analysis.

The fourth chapter contains the results of the study. Finally, Chapter Five presents a discussion of the results, policy recommendations, and conclusions.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this chapter, I provide a review of the literature relating to the smart city and sustainable urban development in Dhaka. The review is organized in six parts: the smart city concept, the debate on technology and equity in smart cities, sustainable urban development, smart mobility and metro rail systems, e-governance and digital public services, and institutional coordination. This literature review does not aim simply at summarizing existing works, but also at placing this research within the context of academic research and policy.

In light of this review, it can be argued that smart city projects may improve urban life if there is a proper policy vision, institutional coordination, and fair distribution and monitoring of the outcomes. On the other hand, smart city projects may increase social inequality if they are too technocratic, only focused on technology and infrastructure. The latter point seems relevant for Dhaka due to the challenges of congestion, socio-economic inequality, informal urbanization, and weak institutional capacity and coordination. This review thus justifies my need to carry out a composite evaluation of MRT-6 and the a2i e-governance programme.

2.2 The Smart City Concept

Smart city is now widely talked about in urban policies globally. Broadly speaking, it means using information and communication technologies (ICT), data analytics, innovation, and integrated infrastructure to improve urban services and enhance urban living standards.

According to Caragliu et al. (2011), a city is smart if the investments in human capital, social capital, transport infrastructure and ICT result in sustainable urban growth and improved quality of life by enhancing collaborative decision-making. This definition is very important as it includes technology, human, institution and sustainability factors. However, even today, in many policy discourses, a smart city is still conceptualized as a technological fix. Digital platforms, sensors, transit cards, e-service websites, and data dashboards are considered as a symbol of urban modernity.

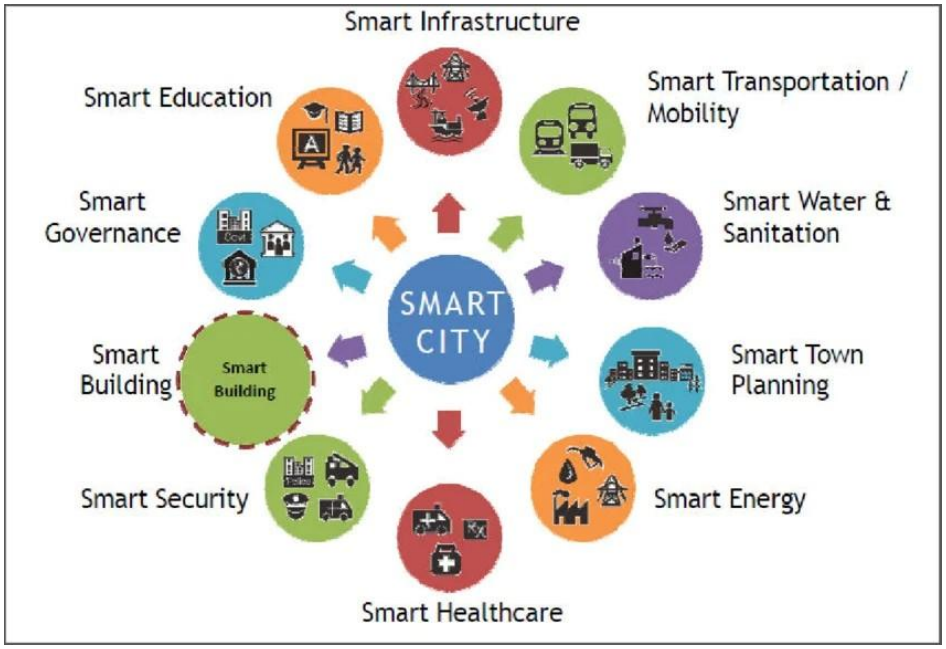


Fig 2.1: Key Components of a Smart City

But no technology alone will solve any urban problem: A digital service could be accessible on a government website, but unless people know about it or trust it, they won't use it; a metro rail might be a sophisticated piece of technology, but what it means for society depends on its accessibility, affordability, and its connectivity with other modes of transport.

In Dhaka's context, this is especially pertinent. Dhaka does need technology and modern infrastructure, but it needs it along with robust institutions that can integrate transportation, land use, digital services and social inclusion. So, for this study, the term 'smart' is not used to ask if MRT-6 or a2i uses technology or not, but if these projects enhance mobility, governance, equity, and environmental sustainability.

2.3 Critical Perspectives on Smart Cities

Critical scholars have pointed out the power, inequality and political economy dimensions of the ‘smart city’ discourse. For example, Hollands (2008) asks: ‘Is the true smart city a city that simply applies a smart city label, or a city that uses innovation to promote democracy, equality, integration and the quality of life?’ This seems relevant as smart city

projects are often presented with positive rhetoric, but the benefits may not be distributed fairly.

The critical view helps us ask practical questions, for example, in the case of Dhaka: Does MRT-6 only provide convenience for users in the middle-income corridor, or does it provide transit accessibility to low-income commuters? Are stations connected to safe walkways, feeder bus services, and non-motorised transport? Do digital public services benefit women, senior citizens, informal workers and residents of low-income neighbourhoods?

These questions explain why we need to include a Development Studies perspective – we must not only ask whether smart city projects are occurring, but whether they lead to enhanced human well-being across social groups. This underscores the need for smart city assessments to take account of equity and governance issues.

The literature therefore suggests that smart city evaluation should include equity and governance indicators. ISO 37122:2019 presents a broad set of smart city indicators covering multiple sectors and SDG 11 provides a normative basis for evaluating development in terms of inclusive and sustainable cities (ISO, 2019; United Nations, 2015). When used together, the two standards offer a framework by which a study can move from assessing project completion to asking whether the projects under study contribute to sustainable urban development.

2.4 Sustainable Urban Development: SDG 11, New Urban Agenda and ISO 37122:2019

Sustainable urban development seeks to enhance social, economic, environmental and institutional factors of cities while ensuring that their long-term capacity to fulfil the needs of future generations remains intact. In urban policy terms, this relates to issues such as affordable and accessible mobility, equitable service provision, environmental protection, inclusive planning and good urban governance. The relevance of these concerns for Dhaka is evident in the significant strain that rapid urbanisation places on the city's transport networks, public services, environment and urban institutions.

SDG 11 provides a vital policy framework for addressing such challenges by calling for cities and human settlements to be inclusive, safe, resilient and sustainable (United Nations, 2015). Three of SDG 11's targets are especially relevant to this study. Target 11.2 refers to access to safe, affordable, accessible and sustainable transport systems, paying specific attention to vulnerable populations. This target is highly relevant to assessing MRT-6. Target 11.3 relates to inclusive and sustainable urbanisation and participatory urban planning and development. This target is relevant to the assessment of MRT-6 from a transport governance perspective and also to a2i from a digital public-service provision standpoint. Target 11.6 relates to reducing the negative environmental impacts of cities, including air quality, which is relevant to examining the environmental impact of sustainable urban transport (United Nations, 2015).

The New Urban Agenda (NUA) is a complementary policy framework that helps to conceptualize how the wider sustainability goals promoted by SDG 11 can be translated into urban development and governance. Endorsed at the UN Conference on Housing and Sustainable Urban Development (Habitat III) in 2016, the NUA advocates for inclusive urban development, sustainable mobility, equitable access to services, good urban governance, integrated planning and participation (United Nations, 2017).

The NUA principles apply to both initiatives under study. For MRT-6, sustainable urban mobility involves not only the functioning of the metro service itself but also its affordability, accessibility, last-mile connectivity and integration within the overall transport network. For a2i, inclusive urban governance entails whether digital public services are accessible to various groups of citizens and integrated across public agencies.

SDG 11 and the New Urban Agenda provide general guidelines and policy directions for sustainable urbanisation. However, ISO 37122:2019 offers a more specific reference for evaluating smart-city performance. The standard provides indicators for areas such as transportation, governance, environment, economy, health, education and society that can be used to evaluate the progress of smart and sustainable cities (International Organization for Standardization [ISO], 2019).

In this study, the full indicator set of ISO 37122 has not been utilized as certain indicators lack consistent data availability for Dhaka. Instead, relevant indicators have been selected

and adapted based on the study's aims and the availability of secondary data. For MRT-6, key indicators considered include ridership levels, modal shift, journey-time savings, environmental impact, affordability and last-mile connectivity. For a2i, key indicators included service coverage, service delivery, digital adoption and digital inclusion. The study thus uses an internationally recognized smart-city standard, while also adjusting the indicators to suit the evidence available in the Bangladeshi context.

Hence, in this study, the three frameworks play distinct, yet complementary roles. SDG 11 and the New Urban Agenda provide the overarching sustainability and policy guidance for assessing policy coherence, whereas ISO 37122 supports the selection and structuring of indicators for evaluating implementation performance. Meanwhile, as will be discussed later in this chapter, Implementation Theory plays a distinct role by explaining why policy intent does not always translate into implementation results. Together, the three frameworks link the study's policy review, performance evaluation and implementation-gap analysis to the broader goal of sustainable urban development in Dhaka.

2.5 Smart Mobility and Metro Rail in Developing Cities

Urban transport is one of the most critical sectors in smart city development. Smart mobility generally refers to transport systems that are efficient, integrated, inclusive and sustainable. In developing megacities, metro rail systems are often established to relieve congestion, decrease travel times and attract passengers from road-based modes. However, the literature suggests that these systems may not achieve their targets.

Pojani and Stead (2015) identify some common obstacles to sustainable urban transport in developing countries, namely, lack of integration, weak institutional capacity, poor land use planning and affordability. A metro system might not be enough if commuters cannot reach the station easily, if the fare is higher than what they currently spend on transport or if it only operates on one corridor. All these factors can be attributed to the MRT-6, which is a big upgrade on the Uttara–Motijheel corridor, but whose full potential relies on feeder services, pedestrian facilities, interchanges, and additional future projects.

Evidence from Bangladesh further supports these concerns. Rahman, Bhuiyan and Khan (2023) report that vulnerable groups in Dhaka experience difficulties in availability,

accessibility, accommodation, acceptability and affordability in the current public-transport system. Although their analysis does not explicitly consider MRT-6, it does take buses into account, which is important as metro users are also likely to use other modes of transport or walk to reach their final destination. Similarly, ADB's work on Greater Dhaka emphasizes the need for integration among public transport systems, non-motorized transport and land use planning as part of sustainable urban mobility (Asian Development Bank [ADB], 2012).

In the case of Dhaka, some of these issues are already reflected in the literature. The MRT-6 offers considerable travel-time savings on the Uttara–Motijheel corridor (The Daily Star, 2023). A study conducted prior to the MRT-6 launch revealed that three quarters of respondents using current forms of transport expressed willing to switch to the MRT. However, the degree to which they were prepared to do so was determined by affordability, ease of access, travel time, comfort, and level of crowding (Aktar et al., 2024).

Saleh et al. (2023) found similar results when examining the factors affecting commuters' intention to switch to metro travel, namely, attitude, perceived behavioral control, and environmental concern. Hence, although this evidence suggests there is a possibility for modal shift, it also shows that affordability and accessibility should be taken into consideration when determining success. Overall, this literature backs up our finding that the success of MRT-6 should not be evaluated using one indicator, but rather multiple indicators, including ridership, modal shift, travel-time reduction, affordability, last-mile connectivity and environmental impact. A metro rail line could be a successful project from an engineering perspective, but may require policy intervention in order to ensure its long-term sustainability and inclusivity.

2.6 Evidence on MRT-6 in Dhaka

As the inaugural urban metro rail system in Bangladesh, the MRT-6 project carries both practical and symbolic importance. As part of the city's broader transport strategy, Line 6 was designated as a key priority for investment in mass rapid transit, and has benefited from substantial assistance in terms of expertise and funding from the Japan International Cooperation Agency (JICA, 2022; JICA Study Team, 2015). The phased launch of services

since 2022 has seen a move away from the predominantly road-based mode of transportation in favour of a high-capacity urban railway system.

Numerous researchers have sought to understand the perceptions of existing and prospective MRT users and have concluded that it is not merely speed which determines service quality. First and last mile experiences are considered to be key elements of the potential demand for MRT (Alom, 2022), while cost, ease of access, user comfort and overall journey time all affect a passenger's decision whether to switch from another mode of transport (Saleh et al., 2023; Aktar et al., 2024). This is consistent with the argument that smart mobility should be evaluated based on the user's experience throughout their journey, rather than simply from the completion of infrastructure.



Fig 2.2: Metro Rail

Media outlets have also provided insights into public perception following the first year of operation of the Dhaka Metro (The Daily Star, 2023), expressing both positive opinions and practical concerns. Although such sources do not constitute formal academic research, they offer additional context when used in conjunction with official statistics and peer-reviewed literature. Overall, the literature reviewed above suggests that MRT-6 has generated a significant improvement at the corridor level, but its wider contribution to

sustainable mobility is constrained by issues of network coverage, integration and affordability.

2.7 E-Governance and Digital Public Services

Another major pillar of smart cities is E-governance. It involves using digital technologies to deliver public services, disseminate information, facilitate government administration and enhance citizen-state engagement. In principle, e-governance can save time, money and reduce corruption by increasing transparency and accessibility. It can also improve data availability for planning and monitoring purposes.

One of the most significant public-service digitalization efforts in Bangladesh is the a2i programme. By utilizing Digital Centres and web portals, a2i has attempted to cut down on the distance, time and costs associated with accessing government services. UNDP Bangladesh (2019, 2020) has described a2i's contribution in terms of "bringing government services to the citizens".



Fig 2.3: Digital Service Centre

In addition, a2i's Digital Centre Framework describes its objectives in terms of "reaching out to the underserved users", including women, older persons and persons with disabilities (Digital Centre, n.d.). Therefore, when assessing the expansion of digital services, the focus

should not be solely on the availability of services, but also whether various groups of people are able to utilize them.

Digital transformation can further support urban governance if local institutions have the requisite capacities to utilise data and digital platforms (Tiwari, 2023). In Dhaka, e-governance can help reduce unnecessary trips to public offices and simplify access to information. However, access is not universal: Bangladesh Bureau of Statistics (2023) data indicate that access to ICTs and the internet is not uniform. In addition, a2i's Digital Centres recognize that some citizens require assistance due to issues of literacy, disability, age or limited digital skills (Digital Centre, n.d.).

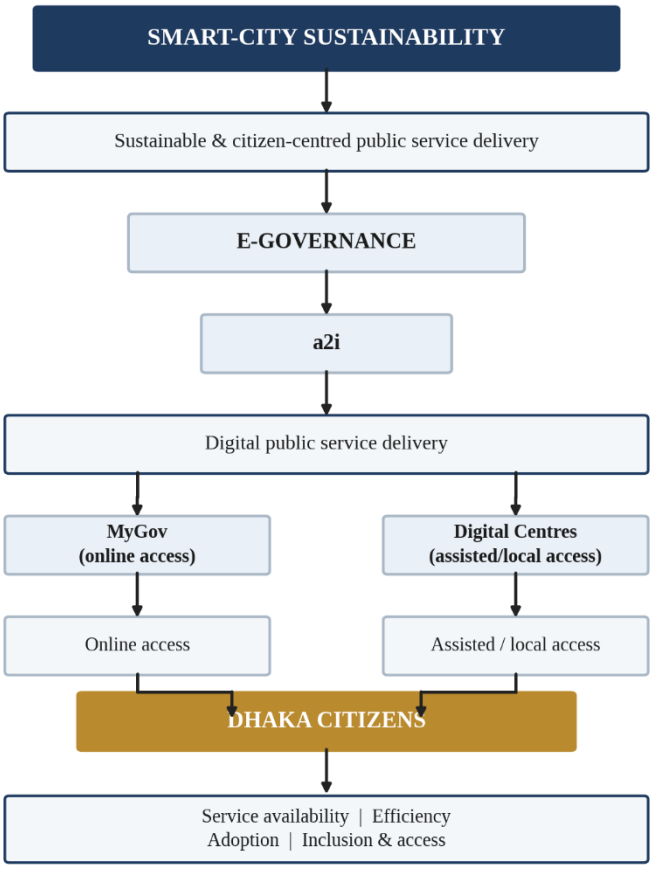
An aspect that is particularly relevant from a Development Studies perspective is that digital inclusion relies not just on physical infrastructure but also on social infrastructure. In this regard, Digital Centres act as localised access points, including within city corporations, aimed at assisting citizens who may be unable to carry out digital services independently (Digital Centre, n.d.). Hence, a2i exemplifies how digital government can integrate online services with physical assistance instead of assuming that all citizens have access or confidence with digital services.

According to the literature, a2i can be evaluated through the lenses of service efficiency and digital inclusion. Relevant indicators include the number of digital services offered, their diversity, reduction in the time required to deliver services, uptake rates, and gender- or income-based disparities in access. A programme may be expanding in terms of the number of services delivered, but may still fail to reach certain segments of the population, which is an important issue.

2.7.1 Relationship Between a2i, MyGov, Digital Centres and Smart-City Sustainability

Here, a2i is treated as an e-governance intervention and not a proxy for smart-city sustainability in the current study. For the Dhaka assessment, the study was restricted to two types of service delivery: (1) MyGov-integrated public services associated with the Dhaka District Administration and (2) assisted access to digital public services through the Digital Centre model in the urban context. MyGov is an online portal that serves as a single

entry point for citizens to search and apply for government services. On the site, public services are listed based on sector, ministry/agency, and target audience. Services linked to the Dhaka District Administration, along with services like licences, certificates, attestations, no objection certificates, and permissions are listed there. It also allows users to save certain information in their profiles along with documents they would like to reuse for future applications (MyGov, n.d.). Digital Centres supplement the online portal by facilitating assisted, local access to both public and private services, especially for citizens with low digital literacy, accessibility or connectivity issues (Digital Centre, n.d.). Therefore, these two mechanisms are assessed in terms of service availability and range, service delivery efficiency, digital adoption, and digital inclusion and access. This study does not look at all a2i efforts or all digital public services in the country.



Source: Author's analysis, 2026

Figure 2.4: a2i's conceptual contribution to smart-city sustainability in Dhaka, from policy formulation through MyGov and Digital Centres to citizen-level outcomes

2.8 Institutional Coordination and Monitoring

Another common theme in the literature on urban development in Bangladesh is institutional coordination. Smart city projects tend to be multi-sectoral. A transport initiative requires coordination between transport authorities, city corporations, traffic police, utility companies and land-use planners, whereas a digital governance initiative requires coordination between line ministries, local government institutions, ICT bodies and service providers. When such actors work in separately, the outcome can be overlapping, fragmentation and a lack of accountability. Governance is the most critical dimension identified by Karmaker et al. (2023) in the development of Dhaka as a smart city.

This is significant to this study as MRT-6 and a2i both require coordination of actors external to the lead implementing agency. MRT-6 cannot be considered an integrated mobility solution if access to stations, feeder transport services, traffic management and urban land use are not integrated. Similarly, a2i cannot be considered to improve the full urban service experience unless the online digital platforms connect to the service processes of agencies and local institutions responsible for service provision.

Hossain et al. (2024) also find that City Corporations in Bangladesh lack capacity in areas of policy evaluation, equitable service delivery and environmental governance. They suggest a standardised M&E framework for sustainable urbanisation. This finding supports the use of a composite sustainability indicator framework by this study: without indicators, policy discussions are general and imprecise. Indicators can help identify where an initiative is succeeding and where policy adjustment is required.

2.9 Research Gap

The review of the literature provides a good understanding of smart cities, MRT systems, e-governance and urban sustainability. However, there are a number of gaps.

Firstly, existing studies generally examine either transport or digital governance in isolation. Studies of MRT-6 typically focus on commuter perception, service quality and

mobility outcomes. E-governance studies typically focus on service delivery and digital inclusion. There is limited literature examining these two types of smart city initiatives together in the context of a sustainability framework.

Secondly, much of the literature discussing the development of smart cities in Bangladesh describes their potential benefits, challenges and opportunities, rather than using a composite indicator approach to measure performance. Hossain et al. (2024) offer a good example of a composite sustainability indicator assessment for select city corporations. However, a similar approach has not been applied jointly to MRT-6 and a2i in Dhaka.

Finally, existing evidence often lacks a strong Development Studies perspective. Technology and infrastructure are widely discussed, but issues of equity, accountability and inclusion are often left out of the main analysis. This study addresses this by applying SDG 11, ISO 37122 and implementation theory to MRT-6 and a2i. It therefore asks not only if these initiatives are 'smart' or 'modern', but also if they are promoting sustainable urban development and inclusion.

2.10 Theoretical and Conceptual Framework

This part outlines the theoretical and conceptual bases that inform the analysis of MRT-6 and a2i. It connects policy execution, smart-city effectiveness, and sustainable urban progression to establish a systematic foundation for assessing the two projects.

2.10.1 Implementation Theory

Implementation theory discusses why the intended impact of policies may not materialise. Pressman and Wildavsky (1973) state that implementation involves a complex interaction of institutional coordination, resources, decision points and administrative linkages. While a policy may have clearly defined aims and objectives, its impact may be limited if the implementation process is poorly managed or fragmented.

In this research, implementation theory is used to discuss the operational aspects of MRT-6 and a2i. Issues such as last mile connectivity, inter-agency coordination and monitoring systems for MRT-6 and digital inclusion, institutional coordination and citizen participation for a2i will be discussed from the lens of implementation theory.

Hill and Hupe (2014) note that implementation is dependent on operational governance, suggesting that the success of a policy is directly dependent on how different agencies coordinate their activities.

2.10.2 Sustainable Urban Development Framework

The second theory is sustainable urban development, which argues that urban development must be balanced between economic, ecological, social, and institutional aspects. SDG 11 and ISO 37122:2019 provide empirical measures for evaluating sustainable development in this study (United Nations, 2015; ISO, 2019).

In line with this theory, MRT-6 is not evaluated only as a transport system project, but as an intervention that promotes sustainable transport, decreases travel costs, and potentially improves the environment.

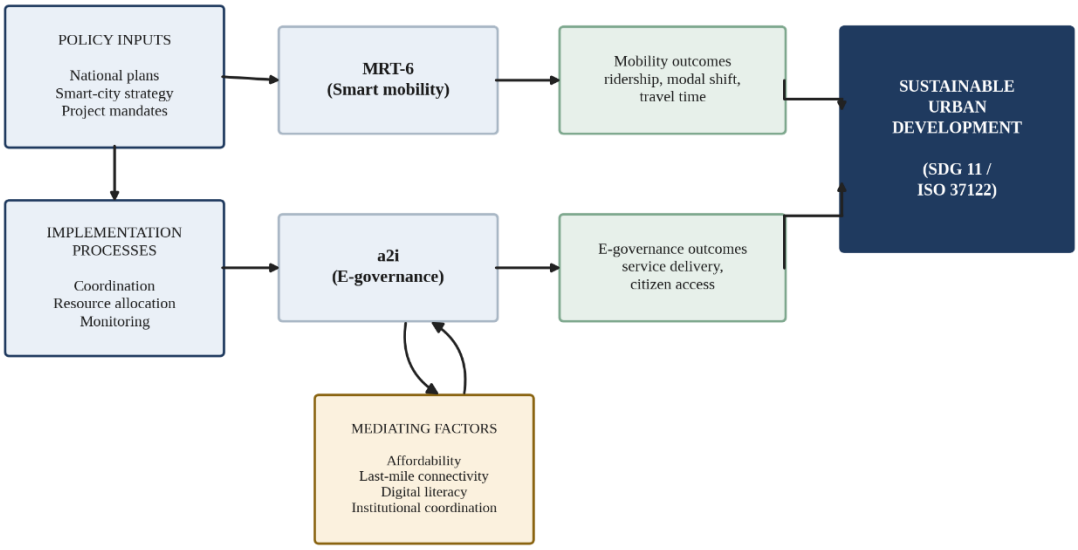
Likewise, a2i is not considered only as a technological platform, but as an intervention that promotes access, efficiency and citizen engagement – an argument that aligns with the Development Studies position that development should be measured by progress in human wellbeing, not just the adoption of technology.

2.10.3 Conceptual Framework of the Study

The conceptual framework of the study presents the linkages between policy inputs, implementation processes and sustainability outcomes. Policy inputs include national development plans, smart city strategies, project goals, and institutional mandates. These inputs affect implementation processes such as coordination, resource allocation, monitoring and access provision, which in turn lead to sustainability outcomes.

For MRT-6, expected outcomes include enhanced mobility through higher ridership, mode shift, shorter travel time and enhanced public transport access. For a2i, expected outcomes include enhanced digital service delivery, lowered administrative burden and enhanced access to citizens. These outcomes are moderated by affordability, last-mile access, digital literacy, gender disparities, and institutional coordination.

The framework thus assumes that technology and infrastructure alone do not ensure sustainable smart city outcomes, without an inclusive implementation and governance process. The conceptual framework is presented in Figure 2.2 below.



Source: Author's analysis, 2026

Figure 2.5 Conceptual framework linking policy inputs, implementation processes, and sustainability outcomes for MRT-6 and a2i.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the methodology adopted to evaluate MRT Line 6 and the a2i e-governance programme as smart city interventions in Dhaka. The study employs an explanatory-evaluative case study approach using exclusively secondary data.

A mixed analytical strategy is used – quantitative evidence is used where comparable numerical data are available, while qualitative document analysis is used to assess policy coherence, institutional arrangements and implementation gaps. Thus, the study combines quantitative and qualitative secondary evidence within a single evaluation design, instead of employing a primary data mixed-methods approach.

The design is developed to address the research questions identified in Chapter One. Given the focus on policy and implementation evaluation, the design pays particular attention to policy coherence, outcome measures, and institutional drivers of success or failure.

3.2 Research Design

The study employs an explanatory-evaluative case study design.[1] Two smart city interventions, MRT-6 and a2i, are selected for analysis. MRT-6 and a2i are considered flagship projects in Dhaka – MRT-6 representing the smart mobility dimension and a2i representing the e-governance and digital public service dimension. The two cases are different enough to illustrate the multi-sector nature of smart city development, and both are intended to improve urban life through modern systems, technology and institutional changes.

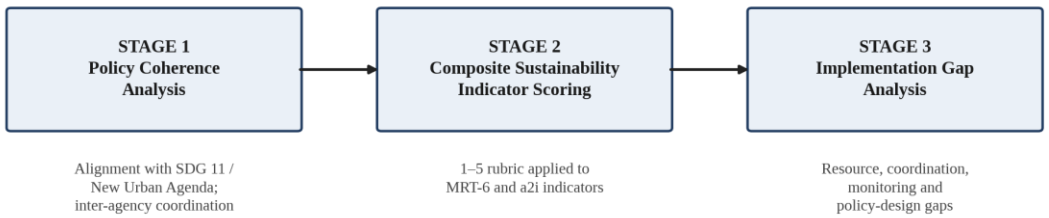
The study does not employ primary interviews, surveys, or field observations. Secondary data sources are used for three main reasons.

1. Policy and implementation evaluation usually involves review of official documents, project reports, published indicators, and prior studies.

[1] An explanatory case study identifies the reasons and mechanisms through which an outcome has emerged and investigates the causal or contextual factors associated with that outcome; an evaluative case study evaluates the performance of a programme or policy against certain standards.

2. Several relevant data sources are already available for MRT-6 and a2i, though they are scattered across agencies and publications.
3. The goal of this study is to create a composite framework that can be reused or updated whenever new data becomes available.

The design involves three steps (Figure 3.1). Step one is policy coherence analysis, which is used to identify what each initiative is expected to achieve. Step two is composite sustainability indicator scoring, which evaluates what results can be observed from the data available. Step three is implementation gap analysis, which uses implementation theory to explain why there are differences between expectations and actual results.



Source: Author's analysis, 2026

Figure 3.1. Three-stage analytical design linking policy coherence analysis, indicator scoring, and implementation gap analysis.

3.3 Study Area

The study area is the Dhaka Metropolitan Area, including areas specifically impacted by MRT-6 and urban digital public service delivery. MRT-6 runs along the Uttara–Motijheel corridor, which covers large residential, commercial, and administrative areas. Although the a2i programme is nationwide, this study focuses specifically on Dhaka-relevant digital public-service delivery through MyGov-integrated services associated with the Dhaka District Administration and assisted access through the Digital Centre model in the urban context.

While a2i is a nationwide public service innovation programme, this study does not evaluate the entire national a2i programme. Rather, it focuses on the parts of the a2i's

digital public service delivery that are relevant to Dhaka. This includes MyGov-integrated services related to the Dhaka District Administration and Digital Centre-based assisted access to digital public services. The MyGov component includes citizen-facing district-administration services and related categories such as licences, certificates, attestations, no-objection certificates and permissions available through the integrated portal (MyGov, n.d.). The Digital Centre component is examined as an assisted-access mechanism rather than as a separate national programme. These components are assessed in terms of service availability and range, service-delivery efficiency, digital service adoption, and digital inclusion/access. National-level a2i and Digital Centre statistics are used only as contextual evidence of programme scale and capacity and are not treated as direct measures of Dhaka-level performance or outcomes.

Dhaka is chosen because it is the country's most significant urban area and the primary location for flagship smart city investments. It suffers from serious congestion, intense population pressure, and complex governance structures, which makes it a good case study to evaluate whether smart city initiatives can contribute to sustainable urban development. Findings from Dhaka could also inform smart city development in other Bangladeshi cities, but the results should not be generalized without accounting for local conditions.

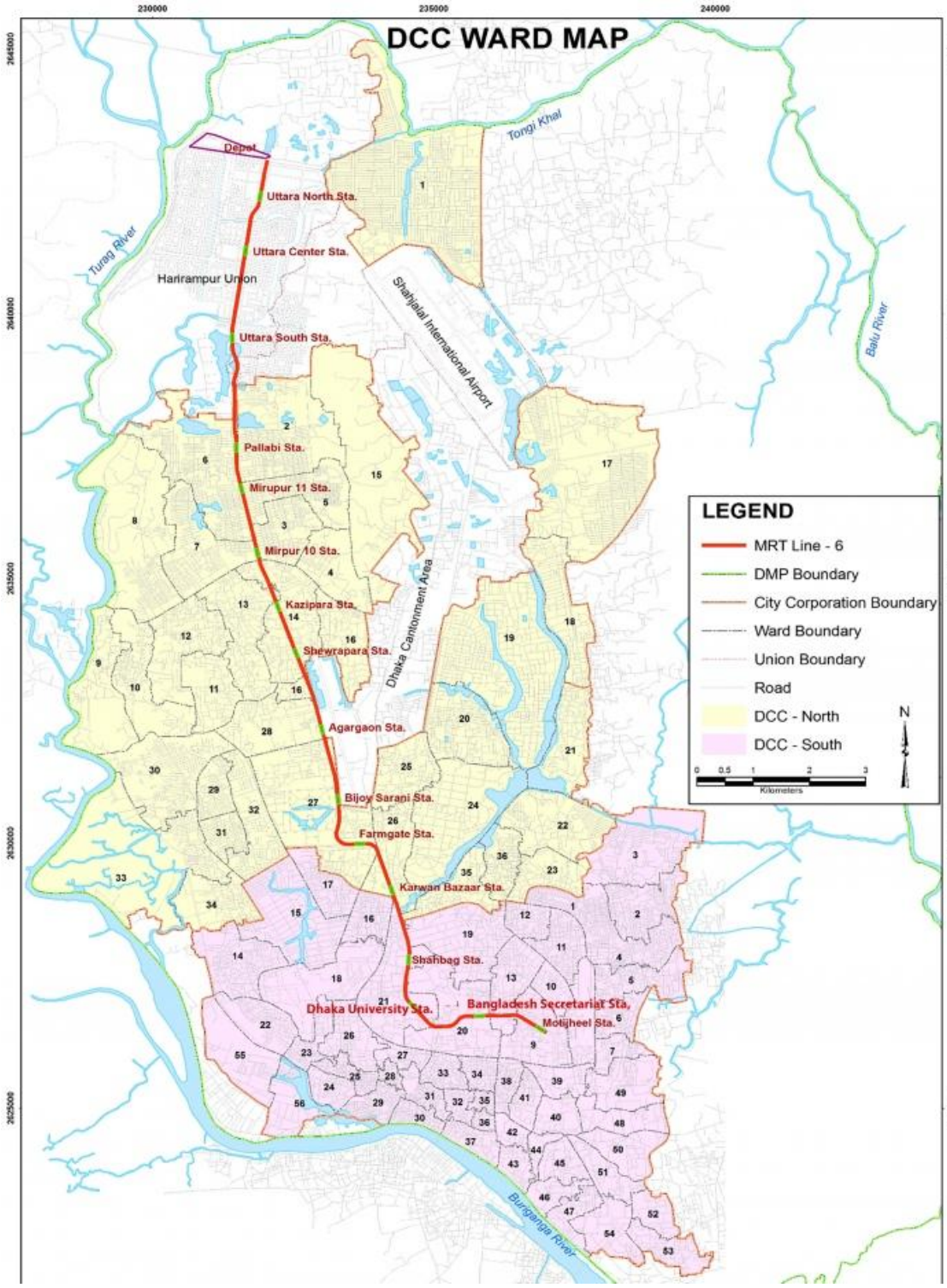


Fig 3.2: Route Map of MRT Line-06

3.4 Time Period of the Study

The analysis focuses predominantly on the period 2019–2024. This time frame encapsulates the most recent phase of policy and execution for smart-city initiatives, the commencement of service by MRT-6, and the continuous rollout of digital governance infrastructures. In select instances, certain 2025 information is employed merely to clarify early-stage performance metrics of MRT-6, such as its all-time highest daily ridership recorded in February 2025 (The Business Standard, 2025). Nevertheless, the core of the paper centers on 2019–2024.

3.5 Data Sources

The secondary data used in this study comprised of five types. First, the government and project documents such as the Revised Strategic Transport Plan, DMTCL's project report, operational report, DNCC and DSCC reports, ICT Division documents and the 8th FYP were used to identify the policy objectives, institutional responsibility and implementation strategy. Second, publications from international organisations such as the World Bank, UN-Habitat, UNESCAP and ADB-CDIA. These documents provided insights to understand the framework of urban development, transport planning, digital transformation and smart city policy support. Third, peer-reviewed journal articles related to the topics of smart city, MRT service quality, e-governance, sustainability of city corporations and implementation theory. Fourth, were the statistical and research data collected from various government agencies including Bangladesh Bureau of Statistics, BUET/ARI study and relevant survey reports where quantitative data such as modal shift, population, internet penetration and cost of congestion were required. Finally, the media reports were collected from various national newspapers including The Daily Star and The Business Standard, but were only considered after thorough vetting and only if they contained verifiable operational details that could be supported with other evidence.

3.6 Data Collection Procedure

This procedure involves collecting data by conducting a document review. Based on the research objectives and the variable matrix, relevant documents will be identified. Documents will be included if they cover the following topics: MRT-6, a2i, smart city

policy, sustainable urban development, SDG 11, ISO 37122 indicators, transport performance, digital service delivery, and institutional coordination. Second, the documents are screened for relevance, credibility, and date. Official reports, peer-reviewed studies, and publications from international organisations are given priority. Third, relevant information is extracted from the documents into a data extraction matrix. For each document, the matrix records the author/organisation, year, document type, main evidence, relevance to the indicator, and limitations. Fourth, the extracted data is organised into three categories that correspond to the research objectives: policy coherence, implementation performance, and implementation gaps. This helps to maintain focus and ensures that the same piece of evidence is not randomly applied to multiple sections of the analysis.

Since this study relies on secondary data, the availability of data varies for each indicator. For some indicators, such as ridership or travel time, the data is well-reported, whereas others such as low-income groups' digital uptake or gender-disaggregated data for city-level service use are not as consistently reported. In such cases, the study applies a structured qualitative rubric and uses triangulation, where possible, from at least two sources.

3.7 Methods of Analysis

3.7.1 Policy Coherence Analysis

Policy coherence analysis evaluates the extent to which the policy framework that directs MRT-6 and a2i are coherent with one another and consistent with sustainable urban development.[2] The analysis addresses three questions: Are the policy's stated objectives consistent with its implementation arrangements? Is the policy aligned with SDG 11, particularly Targets 11.2, 11.3 and 11.6 (United Nations, 2015)? and with relevant principles of the New Urban Agenda including inclusive urban development, sustainable

[2] Policy coherence, as defined in this context, refers to the standard approach within the public policy literature that looks at whether a policy's goals, tools and monitoring systems are mutually reinforcing rather than contradictory; this approach is similar to the OECD's Policy Coherence for Sustainable Development approach but applied here at the urban intervention level instead of the national policy level.

mobility, equitable access to services, integrated planning and effective urban governance?[3] Are there clear coordination arrangements among the implementing agencies (DMTCL, DTCA, DNCC, DSCC, and the ICT Division)?

The analysis is conducted by applying a simple coding technique to the policy documents: the text relating to accessibility, affordability, environmental sustainability, inclusion, data use, citizen service, monitoring, and coordination is identified and coded. The findings are initially categorised as high, medium, or low coherence. These qualitative categories are then mapped onto the 1–5 scoring rubric in Table 3.3 for the final policy-coherence assessment. High coherence implies that the objective, implementation mechanism, and monitoring arrangements are linked; medium coherence implies that the objective is present, but implementation or monitoring arrangements are incomplete; and low coherence indicates that the objective is unclear, not linked to implementation, or lacks quantifiable indicators.

3.7.2 Composite Sustainability Indicator Scoring

The second analytical method is composite sustainability indicator scoring.[4] It is used to assess the performance of MRT-6 and a2i in terms of indicators adapted from SDG 11 and ISO 37122:2019 (ISO, 2019; United Nations, 2015). The indicators are scored on a scale from 1 (very weak) to 5 (very strong). When quantitative data is available, the scoring is based on normalised values (e.g., actual MRT-6 ridership against projected ridership). Where only qualitative information is available, the scoring is based on a structured rubric (e.g., last-mile infrastructure is scored by assessing whether feeder routes, pedestrian access, non-motorised transport facilities, and park-and-ride facilities are available, partially available, or absent). The use of both quantitative and qualitative scoring allows the indicators to be evaluated even when the data is not uniform.

[3] the New Urban Agenda is the final document adopted at the UN Habitat III conference in 2016 outlining the global principles and norms for sustainable urban development, which is used in this study together with SDG 11 as a benchmark for coherence.

[4] A composite indicator is created by aggregating multiple individual indicators using a specific scoring algorithm; this is a common method for benchmarking and tracking progress on sustainable development

3.7.3 Implementation Gap Analysis

The third analytical method is implementation gap analysis[5]. Once the policy coherence analysis and indicator scoring have been completed, the study identifies the gaps between the policy intention and the actual implementation outcomes. These gaps are interpreted using implementation theory (Pressman & Wildavsky, 1973; Hill & Hupe, 2014). The gaps are categorised as follows: resource gaps (lack of funding, technology, or human resources); coordination gaps (insufficient collaboration between stakeholders); monitoring gaps (lack of indicators, information sharing, or feedback mechanisms); and policy design gaps (misalignment between policy objectives and available tools). These gap categories assist the study to progress from description to analysis.

3.8 Variables and Indicators

The variables of this study are classified based on the three research objectives. The analytical dimensions and indicators are organised according to the three research objectives. The first group assesses policy coherence and governance conditions; the second assesses MRT-6 and a2i implementation performance; and the third identifies cross-cutting implementation gaps. Affordability, last-mile connectivity and digital inclusion are treated as important dimensions of inclusive sustainability outcomes.

Table 3.1. Variable and indicator matrix by research objective

Objective	Main Variable	Indicator	Measurement Approach	Key Data Sources
Obj. 1: Policy coherence	Policy alignment	Alignment with SDG 11 Targets 11.2, 11.3 and 11.6 and relevant New Urban Agenda principles	Qualitative content analysis; high/medium/low rubric	8th Five-Year Plan; DTCA STP; ICT Division docs
Obj. 1: Policy coherence	Institutional coordination	Formal coordination among DMTCL, DTCA, DNCC,	Count/quality of joint structures, MoUs, reporting	DMTCL, DTCA, city corporation, ICT

[5] An implementation gap refers to the discrepancy between the intended objectives of a policy and the reality of what has been accomplished on the ground.

		DSCC, ICT Division		Division docs
Obj. 2a: MRT-6	Smart mobility outcome	Actual vs. projected ridership	Reported/projected ratio converted to score	DMTCL reports; verified media
Obj. 2a: MRT-6	Smart mobility outcome	Modal shift from bus/other modes	Reported switching rate; commuter studies	Aktar et al. (2024); Saleh et al. (2023); Alom (2022)
Obj. 2a: MRT-6	Mediating factor	Fare affordability & last-mile connectivity	Fare as share of daily wage; access rubric	DMTCL fare schedule; DTCA plans; World Bank
Obj. 2b: a2i	E-governance outcome	Number/range of digital services	Change in service categories & platform availability	a2i reports; BBS
Obj. 2b: a2i	Digital inclusion	Gender/income-based access	Female/male user ratio; low-income access evidence	a2i (n.d.)
Obj. 2c: Cross-cutting	Composite performance	Equal-weight composite performance across evaluable dimensions	1–5 scoring; equal-weight mean of indicators with sufficient evidence	All sources; ISO 37122 indicators
Obj. 3: Implementation gaps	Implementation conditions	Resource, coordination, monitoring and policy-design gaps	Comparison of policy intentions with documented implementation outcomes; qualitative gap classification	All relevant policy, project, institutional and performance sources

Source: Author's analysis, 2026

Table 3.2 illustrates how the research objectives are translated into the methodology and subsequently into Chapters Four and Five. This serves to regulate the analysis from exploring issues beyond the objectives, or making recommendations that lack sufficient evidentiary support.

Table 3.2. : Translation of research objectives into methodology, Ch.4 outputs and Ch.5 use.

Objective	Method	Main Evidence	Ch.4 Output	Ch.5 Use
Obj. 1	Policy coherence analysis	Policy goals, instruments, inclusion, coordination, M&E arrangements	§4.3: alignment, coordination, M&E maturity	Explains governance weaknesses; supports coordination/monitoring recommendations
Obj. 2	Composite indicator scoring	MRT-6: ridership, modal shift, journey time, emissions, affordability, last-mile. a2i: service range, time reduction, adoption, inclusion	§4.4–4.6: indicator evidence, scores, sub-scores, composite score	Interprets strengths/weaknesses of mobility and digital-service outcomes
Obj. 3	Implementation gap analysis	Gaps classified as resource, coordination, monitoring, policy-design	§4.7: four-category gap analysis	§5.3 recommendations linked directly to gap categories

Source: Author's analysis, 2026

3.9 Scoring Rubric

This study employs a 1–5 scoring rubric for transparency and replicability. For quantitative indicators that have a defined quantitative benchmark, the achievement ratio (actual / target, × 100%) is used: < 40% = score 1; 40% – 59% = score 2; 60% – 79% = score 3; 80% – 99% = score 4; ≥ 100% = score 5. This percentage-based approach is used only where the numerator and denominator represent comparable quantities, and not for indicators that lack a valid quantitative benchmark.

For qualitative or partially quantified indicators, the same 1–5 scale is used based on predefined evidence criteria: 1 = no or negligible implementation evidence; 2 = limited or fragmented implementation with major gaps; 3 = partial implementation with important gaps; 4 = extensive implementation with minor gaps; and 5 = full implementation supported by robust evidence. Where an indicator is conceptually relevant but the available

evidence is insufficient, geographically inappropriate, or lacks the denominator needed to assess the outcome, it is classified as NE (Not Evaluated) rather than automatically receiving a low numerical score. NE therefore indicates an evidence or monitoring gap, not poor programme performance. NE indicators are discussed qualitatively and excluded from the numerical composite mean. Where an indicator has its own evidence standards, those indicator-specific rules supersede the general rules in Table 3.3.

Table 3.3. Indicator-specific scoring rules (summary of the full rubric applied in Chapter 4

Indicator	Scoring Rule (summary)
Policy alignment with SDG 11 / NUA	1: no alignment · 2: stated only · 3: goals with partial instruments · 4: goals + most instruments/monitoring · 5: fully operationalised & monitored
Inter-agency coordination	1: none · 2: ad hoc · 3: formal but incomplete · 4: regular formal coordination · 5: institutionalised joint governance
M&E system maturity	1: no system · 2: agency-specific only · 3: several indicators, periodic reporting · 4: integrated, minor gaps · 5: comprehensive shared dashboard
MRT-6 ridership achievement	Actual/projected daily ridership × 100, banded 1 (<40%) to 5 (≥100%); record-day values labelled as such
MRT-6 modal shift	1: no evidence · 2: isolated/weak evidence · 3: credible stated-preference or partial post-operation evidence but no representative observed city-wide shift · 4: strong observed post-operation shift evidence · 5: representative, sustained city-wide modal-shift evidence
MRT-6 journey-time reduction	% reduction vs. comparable pre-MRT road journey, banded 1 (<20%) to 5 (≥80%)
MRT-6 emission reduction proxy	1: no evidence · 2: theoretical only · 3: credible proxy, no net series · 4: measured with limitations · 5: robust longitudinal evidence
MRT-6 fare affordability	1: exclusionary/no consideration · 2: concern documented, no benchmark · 3: some concessions/analysis · 4: regular

	monitoring & measures · 5: institutionalised benchmark with demonstrated equity
MRT-6 last-mile infrastructure	1: almost absent · 2: limited/fragmented · 3: ~half of elements present · 4: most elements integrated · 5: comprehensive, monitored integration
a2i service volume & range	1: very limited · 2: small/fragmented · 3: substantial but incomplete · 4: broad, Dhaka-integrated · 5: comprehensive end-to-end coverage
a2i service-delivery time reduction	1: no evidence · 2: claimed only · 3: credible but no consolidated series · 4: measured across many services · 5: comprehensive, regularly monitored
a2i digital adoption rate	NE where no valid Dhaka-specific denominator/outcome measure exists · 1–5 only when Dhaka-specific adoption evidence is sufficient to apply the rubric; national cumulative figures are contextual, not a Dhaka adoption rate
a2i digital inclusion	1: no provision/evidence · 2: mechanisms exist, weak outcome data · 3: some disaggregated evidence · 4: strong uptake, small gaps · 5: equitable, routinely monitored uptake

Source: Author's analysis, 2026

When all evaluable indicators have been scored, the composite score is computed by averaging the indicators that have enough evidence: Composite score = Sum of valid numerical scores / Number of numerically evaluated indicators. The indicators which are classified as NE are not included in the denominator and are reported separately as gaps in evidence. We include both policy/governance indicators and initiative-level indicators in our composite score because the conceptual model assumes that governance, implementation and inclusion are part of smart-city sustainability. To avoid concealing differences between the initiatives, Chapter Four also reports separate MRT-6 and a2i sub-scores and the policy-coherence scores. Equal weighting is retained because no stakeholder weighting exercise was undertaken. The composite score is therefore an analytical summary rather than an official or definitive sustainability rating. Scores are interpreted as follows: 1.00–1.80 very weak; 1.81–2.60 weak; 2.61–3.40 moderate; 3.41–4.20 good; and 4.21–5.00 very strong.

3.10 Analytical Procedure

The analysis follows the order of the research objectives. In the first stage, the study examines the policy objectives and institutional arrangements of MRT-6 and a2i and relate them to SDG 11 and relevant principles of the New Urban Agenda.

In the second stage, the study extracts evidence for the pre-selected indicators and apply the scoring rules in Table 3.3. A numerical score is assigned only where the evidence meets the minimum requirements of the quantitative or qualitative rubric; indicators without sufficient outcome evidence are reported as NE and treated as monitoring/evidence gaps.

In the third stage, the study compares the intention of the policies to the evidence of actual or recorded performance in order to determine gaps related to resource allocation, coordination, monitoring and policy design.

Finally, Chapter Five interprets these results in light of the theoretical framework and transform the identified gaps into recommendations. This ensures that there is a logical flow from research objective to research method to data collection and analysis to recommendations.

For MRT-6, the analysis considers the indicators relating to ridership, mode shift, travel time, reduced emissions (proxy), fare affordability, and last-mile connectivity and infrastructure.

For a2i, the analysis focuses on digital service volume, service delivery time, uptake of digital services and inclusion based on gender and income (where data is available).

Institutional coordination and monitoring capacity is examined across both initiatives.

The final analysis is presented in prose and tables in Chapter Four, combining contextual and institutional analysis with data on the specific indicators.

3.11 Validity and Reliability

Validity is addressed by the alignment between the research questions, the chosen indicators and the sources of data. It is not a coincidence that these are the chosen indicators, as these were selected from SDG 11, ISO 37122 and the variable table created

for this study. This supports the content validity of the study as the chosen indicators reflect widely known concerns about sustainable urban development and smart cities.

Reliability is addressed through the transparent scoring rubric, specific rules about what evidence to use for each indicator and the citation and triangulation of sources. Each numerical value has a piece of evidence behind it that justifies the number. When there is not enough evidence to provide a justified score, the indicator is marked as NE instead of being scored low due to the absence of data. By distinguishing between evidence of performance and the availability of data, the possibility of equating poor monitoring with poor execution is mitigated. Some subjective judgment will remain, however, with predefined standards and a clear evidence trail linking it back to the score, the process can be reviewed and replicated.

Triangulation becomes especially relevant considering the type of data likely to be found, as its origin and quality will probably be inconsistent. Official sources might want to showcase the achievements of MRT-6 and a2i, whereas academic sources may want to report on the difficulties encountered by those programs. Media sources might prefer to cover problems as they happen. Using multiple sources ensures that the research does not become overly dependent on a single perspective.

3.12 Ethical Considerations

Because the study uses only secondary data from public sources, it does not involve research involving human subjects and therefore no informed consent is required. However, the researcher must be honest. All sources have been cited using in-text citations and an APA reference list, and no data has been presented in isolation to support a biased claim.

The study is transparent about its weaknesses, acknowledging that there are areas where information is unavailable or outdated, or has not been disaggregated according to gender, income bracket, or region. This is especially significant when discussing sustainable development. If data on the effectiveness of certain programmes is incomplete, it is misleading to claim conclusively that those programmes have been effective. It is also

unethical to present a study on public policy that impacts people without acknowledging that there are limits to what we know.

3.13 Limitations of Methodology

One shortcoming of this study is its reliance on secondary data. It was not possible for the study to collect primary data on commuters, citizens and households' access to digital services. Some equity outcomes may therefore remain unaccounted for, especially among the vulnerable population in informal settlements and low-income earners who use subsidised services. To mitigate this limitation, the study uses information gathered through surveys, reports, and studies. However, it is not possible to substitute this data for information gathered through primary fieldwork.

Another limitation is the lack of standardization in how data is reported. Different organizations may measure different indicators, report data over different time periods, or use non-comparable formats to report data. This may make it more difficult to develop a composite score for certain indicators. The study addresses this limitation by developing a clear rubric for assigning scores, and indicating when data quality is a factor in the reliability of the score.

A third limitation is that certain outcomes of smart city initiatives may not be immediately apparent. MRT-6 is only one part of a broader planned network of metro lines, and its overall effect on traffic congestion and carbon emissions will depend in part on the construction of additional lines. Similarly, the digital transformation of government services offered by a2i may continue to evolve as digital literacy, internet access, and the functioning of city corporations improves. The study is therefore viewed as an assessment of the current status and recent past performance of the MRT-6 and a2i projects, rather than a definitive evaluation of their potential in the long term.

3.14 Summary of Methodology

This chapter outlined the methodological approach used to evaluate the MRT-6 project and the a2i e-governance initiative. The study follows an explanatory-evaluative case study approach using secondary data.

The analysis utilizes a combination of methods including an examination of policy coherence, assessment of composite sustainability indicators, and identification of gaps between the goals of the policies and their implementation. This methodology is designed to be feasible and transparent for a thesis in Development Studies.

Each of the research objectives has a corresponding research method and indicator set, and each will be analyzed in a distinct section of the study. This analytical framework is applied in Chapter Four.

CHAPTER FOUR: FINDINGS AND ANALYSIS

4.1 Introduction

This chapter presents the findings in the order of the objectives and analytical methods outlined in Chapter Three. Section 4.3 addresses Objective 1 with the policy coherence analysis. Sections 4.4–4.6 address Objective 2 with the pre-specified MRT-6 and a2i sustainability indicators and composite scoring rules. Section 4.7 addresses Objective 3 with a categorization of the differences between policy intention and documented performance as resource, coordination, monitoring, and policy-design gaps. The one-to-one arrangement makes the analysis transparently linked to the research design.

The main time frame for the analysis is 2019–2024. In line with the methodology, some evidence from 2025 is included only when it adds clarity on early implementation, particularly on MRT-6 ridership and traffic congestion impacts. The study uses secondary evidence only, and the scores reported below are analytical scores generated by applying the 1–5 rubric described in Chapter Three rather than government scores. Whenever the evidence is partial or country-level instead of Dhaka-specific, this is clearly indicated.

4.2 Interpretation of the Scoring Rules

Chapter Three specifies the overall and indicator-specific scoring rules. For quantitative indicators, the observed value was compared with the relevant benchmark and assigned a score according to the predefined achievement bands presented in Chapter Three. Where the available evidence represented a single observation rather than a longer-term average, this limitation was considered when interpreting the score. Where adequate qualitative evidence exists, the predefined implementation criteria are used. Where the available evidence is insufficient to determine an outcome—particularly where a Dhaka-specific denominator is absent—the indicator is classified as NE rather than being given a low score merely because data are unavailable.

Table 4.1. Interpretation of the 1–5 scoring framework used throughout Chapter Four.

Score	Category	Interpretation
1	Very weak	The indicator is absent, undocumented, or clearly ineffective.
2	Weak	The indicator exists in limited form, but implementation is incomplete or poorly coordinated.
3	Moderate	Partial achievement is visible, but important gaps remain.
4	Good	Strong achievement is visible, with limited material gaps.
5	Very strong	The outcome is clearly achieved, institutionalised, and supported by reliable evidence.

Source: Author's analysis, 2026

Each score presented is accompanied by the specific evidence that justifies the rule applied. Scores of 2 or 3 therefore indicate that the available evidence meets the predefined criteria for limited or partial implementation, not simply that data are scarce. Where the evidence cannot support a defensible outcome assessment, the indicator is reported as NE and discussed as a monitoring or evidence gap.

4.3 Findings for Research Objective One: Policy Coherence

The first research objective was to examine the policy frameworks relevant to MRT-6 and a2i and evaluate how coherent and aligned they are with SDG 11 and the New Urban Agenda. On the whole, both initiatives are driven by clear policy goals that are in line with Bangladesh's wider development direction. The evidence, however, suggests a recurring difference between policy intention and implementation arrangements: while the policies contain targets on improving mobility, providing digital services, enhancing inclusion, and promoting sustainability, they do not contain detailed plans for joint monitoring, inter-agency coordination, or measurable equity safeguards.

4.3.1 Alignment with SDG 11 and the New Urban Agenda

MRT-6 is strongly aligned with SDG target 11.2, which aims to provide access to safe, affordable, accessible, and sustainable transport systems for all. By expanding high-capacity public transport in a city affected by heavy congestion, MRT-6 directly contributes to this goal. The Revised Strategic Transport Plan similarly sees the MRT as part of an

integrated mass-transit system, rather than a standalone rail project (JICA Study Team, 2015). It may relate to target 11.6, as electric mass transit could lower emissions from road transport if it draws riders away from motorised road modes, but there is no reliable public post-operation emissions series to establish its environmental impact.

The link to target 11.3 is weaker. Achieving inclusive and sustainable urbanisation involves more than just constructing the rail line; it also requires accessible stations, safe walking conditions, reliable connecting services, coordinated land use, and equitable access for all income levels. Likewise, studies on transport in developing cities emphasise that accessibility, affordability, and integration are crucial factors for large transit investments to deliver broader sustainability gains (Pojani & Stead, 2015).

The a2i programme enhances the governance and inclusion aspects of sustainable urbanisation by streamlining public services and increasing both digital and assisted access to them. In 2023, 59 services of the Dhaka district administration were included in the MyGov system, which had reportedly more than four million registered users and 1,892 digital services available (Bangladesh Sangbad Sangstha [BSS], 2023). a2i's Digital Centre model also offers assisted access through localised one-stop service centres and specifically targets underserved populations, including women, older persons, and people with disabilities (Aspire to Innovate [a2i], n.d.).

However, there is no existing data at the Dhaka level showing ward, income, gender, disability, and/or area-of-residence-based service use, so while a2i is definitely geared towards making public services accessible to all, we cannot establish from secondary evidence provided that benefits are being distributed equally within Dhaka.

Policy alignment is therefore assessed as moderately strong rather than very strong – while the general policy intentions can be established, a few sustainability-related criteria are not yet operationalised in measurable ways.

4.3.2 Inter-Agency Coordination

In both cases, the initiatives are implemented by organisations that fall beyond the purview of the lead organisation. For instance, even though MRT-6 is managed by the DMTCL, the success of Dhaka's transport system relies on a range of other agencies, including transport

agencies, city corporations, road agencies, sidewalk builders, traffic police, and providers of feeder transport. In a similar vein, a2i delivers services via national digital channels and government ministries; however, interactions between citizens of Dhaka and service providers will be carried out by district administrations, city corporations, service delivery agencies and other sectoral organisations.

There is no evidence of an inter-agency mechanism for monitoring the sustainability outcomes of MRT-6 and digital public services together in any of the documents reviewed in this study. This finding is consistent with a number of studies that analyse the transition towards smart-cities in Dhaka and note that governance and institutional capacity are major concerns (Karmaker et al., 2023), and with a recent study on Bangladeshi city corporations that highlights governance, information, monitoring and institutional capacity in the domain of sustainable urbanisation as persistent issues (Hossain et al., 2024). Hence, the rating of inter-agency coordination is 2 out of 5.

4.3.3 Monitoring and Evaluation System Maturity

Both projects have monitoring reports in place but the indicators are misaligned. The MRT's reporting typically focuses on indicators related to construction progress, passenger ridership, service operations and financial returns, while the a2i reporting typically covers indicators on service availability, usage of the digital platforms, service points and process improvement.

While these indicators may be useful, there is no common "dashboard" on sustainability that reflects performance across all five dimensions (mobility, environment, affordability, inclusion and governance). There is also no baseline from which to compare against, or any way of periodically tracking progress across sectors. Trade-offs between the objectives are therefore difficult to assess. The monitoring and evaluation score is thus 2 out of 5.

Table 4.2 Policy Coherence Evidence Matrix

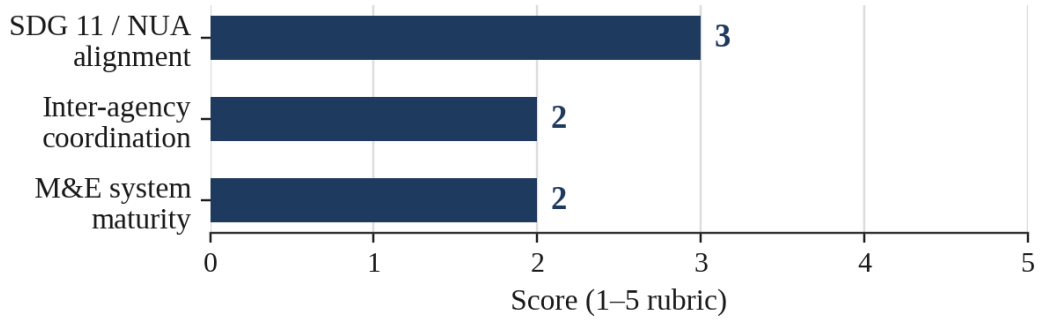
Policy/document	Evidence examined	SDG/NUA connection	Implementation/monitoring evidence	Assessment
Revised Strategic Transport Plan	MRT network, integration and mobility objectives	SDG 11.2; sustainable mobility	Strong transport objective; weaker integrated monitoring	Medium–High
8th Five-Year Plan	Sustainable transport, digitalisation, inclusion	SDG 11 / NUA	Broad goals; implementation spread across agencies	Medium
MRT-6/JICA project documents	Mobility, congestion, environmental objectives	11.2, 11.6	Clear project mechanism; wider equity monitoring limited	Medium–High
a2i/ICT Division documents	Accessible digital public services	NUA equitable service access	Assisted-access mechanism exists; Dhaka-disaggregated monitoring limited	Medium
Relevant DNCC/DSCC documents	Local service/urban functions	NUA governance/integration	Cross-agency integration not consistently documented	Low–Medium

Source: Author's analysis, 2026

Table 4.3: Policy-coherence indicator scores

Policy-Coherence Indicator	**Score**	**Main Finding**
SDG 11 / New Urban Agenda alignment	3	Clear policy alignment, but affordability, participation, environmental measurement, and disaggregated inclusion are only partly operationalised.
Inter-agency coordination	2	Multiple agencies are involved, but a clearly institutionalised joint sustainability mechanism was not identified.
M&E system maturity	2	Operational data exist, but there is no shared cross-sector sustainability dashboard or common reporting framework.

Source: Author's analysis, 2026



Source: Author's analysis, 2026

Figure 4.1. Policy coherence indicator scores.

4.4 Findings for Research Objective Two: MRT-6 Implementation Performance

According to official DMTCL information, MRT Line 6 is the first elevated metro-rail line in Bangladesh. The operational portion of the line between Uttara North and Motijheel consists of 16 stations, while DMTCL's route information also indicates that Kamalapur is the planned extension station (Dhaka Mass Transit Company Limited [DMTCL], 2023). These are static attributes of the infrastructure that provide context for

the analysis at the corridor level below, but are not considered in the scoring of performance in this indicator.

4.4.1 Ridership Achievement

One of the most convincing signs that MRT-6 has become an essential component of everyday mobility in Dhaka is its ridership figures. In the Revised Strategic Transport Plan, the projected ridership for MRT-6 in 2025 was 483,200 daily passenger boardings (JICA Study Team, 2015). In February 2025, the DMTCL reported record ridership of 403,164 passengers in one day, which represents 83 per cent of this estimate (The Business Standard [TBS], 2025). Of course, a record day is not the same as a daily average, so care should be taken in making comparisons; however, this example indicates strong levels of demand even within the first few months of service. Therefore, the ridership indicator receives a score of 4 out of 5.

4.4.2 Modal Shift

A key component of the sustainability impact of a metro rail project is the degree to which it alters travel behaviour.[6] Studies undertaken near the opening of MRT-6 found that there is a high propensity among public transport and paratransit users to switch to metro rail, though fares, accessibility, travel time, comfort and crowding also matter (Saleh et al., 2023; Islam et al., 2024). This suggests a modal shift effect, albeit without any firm indication of a comprehensive shift in modal share at a city level. The modal shift indicator is thus scored 3 out of 5. The evidence is meaningful but incomplete for measuring actual city-wide modal shift.

4.4.3 Journey-Time Reduction

The most compelling MRT-6 benefit is the reduction in travel time. The estimated journey time from Uttara North to Motijeel is 31 minutes, compared to 2 to 3 hours by road during peak hours (The Daily Star, 2023).

[6] A modal shift refers to a change in the proportion of trips made by one mode of transportation compared to another; here, it refers to the transfer of commuters away from buses, paratransit and private cars to the metro rail.

This benefit is important not only in terms of saving travel time but also for improving the travel experience of passengers such as workers and students. This indicator is scored 5 out of 5.

4.4.4 Emission Reduction Proxy

MRT-6 is an electric mode of transport with high carrying capacity, and therefore has the potential to significantly reduce transport emissions per passenger, especially when commuters use it instead of higher emitting motorised options. However, there does not seem to be any publicly available, consistent post operation data for estimating the net decrease in greenhouse gas emissions attributable to MRT-6, and a comprehensive analysis would require taking into account emissions from electricity generation, construction emissions, changes in bus services and induced demand. The proxy therefore scores 3 out of 5: although the project is likely to have environmental benefits, it remains unclear how much benefit has been delivered.

4.4.5 Fare Affordability

The MRT-6's fare structure, which shows that a single journey starts at a minimum of Tk 20 and the entire Uttara North–Motijheel route costs Tk 100 (with fares increasing depending on distance), and discounts of 10% with the use of an MRT Pass (Dhaka Mass Transit Company Limited [DMTCL], n.d.), illustrates that there is a fair and discounted fare structure. Nevertheless, the existence of a set fare structure does not, on its own, prove affordability. Affordability depends on the relationship between regular travel costs and passengers' income, particularly for low-income commuters. Research on commuter perceptions of Dhaka's MRT system indicates that affordability and reasonable fare levels contribute to people's willingness to use the service (Saleh et al., 2023; Akter et al., 2024). Unfortunately, no widely accessible, regularly-updated fare-burden data were found in the literature to compare the proportion of income that different groups of passengers spend on their commute by MRT. The fare affordability[7] indicator scores 2 out of 5, indicating a

[7] In transport research, affordability is commonly measured by calculating the percentage of a household's income that is spent on transport costs. No such data on MRT-6 was available at the time of writing.

lack of specific evidence that the fare serves as an explicit equity-enabling measure, this should not be interpreted as proof that the fare is unaffordable for all users.

4.4.6 Last-Mile Infrastructure

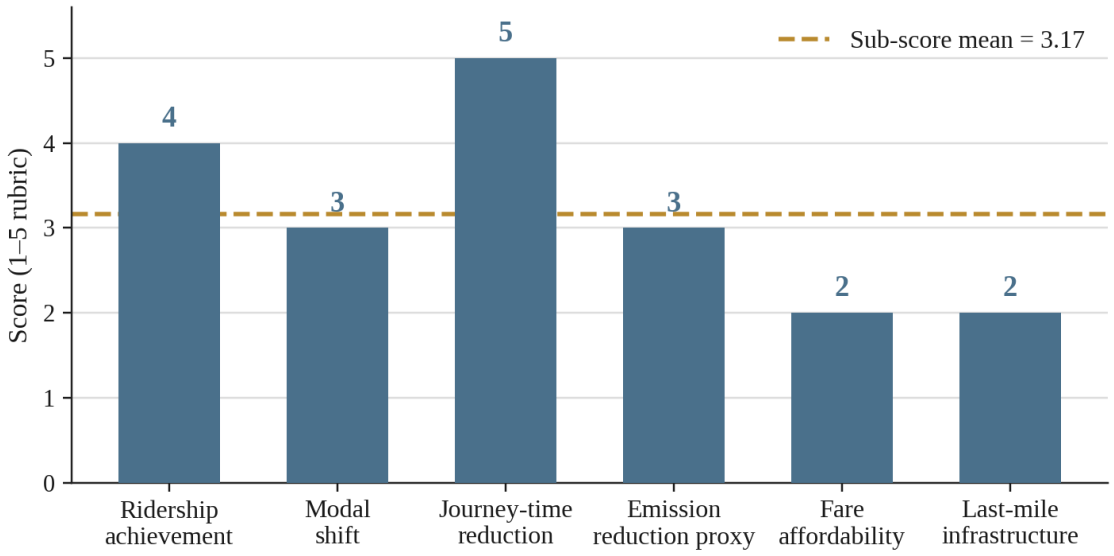
Similarly, last-mile connectivity presents another gap.[8] The utility of a metro station is compromised if commuters cannot access it easily and safely via walkways, feeder buses, NMT, or other means. The broader literature on metro rail systems in developing cities highlights inadequate integration and access as major barriers to achieving desired sustainability outcomes (Pojani & Stead, 2015). Based on the evidence reviewed, the current status of feeder transportation systems or pedestrian access conditions across MRT-6 stations in Dhaka does not appear to be uniformly adequate. The last-mile infrastructure indicator scores 2 out of 5.

Table 4.4: MRT-6 sustainability indicator scores

MRT-6 Indicator	Score	Evidence-Based Interpretation
Ridership achievement	4	Record daily ridership in February 2025 reached ~83% of the 2025 RSTP forecast; record-day use is not an annual average.
Modal shift	3	Strong stated-preference evidence of shift potential, but no representative observed post-operation city-wide modal-share change is established.
Journey-time reduction	5	Uttara–Motijheel travel is ~31 minutes, a major improvement over highly congested road travel.
Emission reduction proxy	3	Credible electric-transit emissions pathway, but realised net GHG reduction is not directly measured; treated as a proxy.
Fare affordability	2	Official fares exist, but a Dhaka income-linked fare-burden benchmark/equity safeguard is not sufficiently evidenced.
Last-mile infrastructure	2	Feeder, pedestrian, NMT and interchange integration remain fragmented or inconsistently documented across stations.

Source: Author's analysis, 2026

[8] Last-mile connectivity refers to the accessibility and safety of the final portion of a journey between a transit stop and a commuter's home or workplace, generally walking, via a feeder bus or through non-motorised transport (NMT) such as rickshaws or bicycles.



Source: Author's analysis, 2026

Figure 4.2. MRT-6 sustainability indicator scores (sub-score = 3.17/5, equal-weight mean).

4.5 Findings for Research Objective Two: a2i E-Governance Implementation Performance

Building on the conceptual relationship established in Chapter 2**,** the present section explores how the implementation of digital public service delivery using a2i tools is manifesting in Dhaka. Specifically, this analysis evaluates the effectiveness of services delivered through MyGov and the Digital Centre model based on four aspects: service availability and range, service delivery efficiency, digital service adoption, and digital inclusion and access.

4.5.1 Scope of a2i assessment in Dhaka

Based on the scope outlined in Chapter Three, this assessment does not evaluate the entire national a2i programme. It focuses on two Dhaka-related service delivery components, MyGov integrated services (associated with Dhaka District Administration) and Digital Centre assisted access.

The MyGov portal is described as a common gateway for citizen services and currently lists its services under various sector, ministry/agency and service recipient group headings; relevant service categories include services from the District Administration, Licences, Certificates, Attestations, NOCs and Permissions (MyGov, n.d.). Digital Centres are considered as the assisted access channel enabling citizens to access digital and other services locally (Digital Centre, n.d.). Therefore, the assessment evaluates service availability/range, efficiency, adoption and inclusion/access within the scope of these two components.

4.5.2 Digital Service Availability and Range

Evidence: The Dhaka-specific component is evidenced by the integration of 59 Dhaka District Administration services to MyGov in 2023 (Bangladesh Sangbad Sangstha [BSS], 2023). The MyGov portal itself confirms that it is a common gateway for various citizen service categories including District Administration services, application for licences, certificates, attestations, no objection certificate and permissions (MyGov, n.d.). This helps to more clearly define the types of services being considered in the study, rather than the overall a2i national programme.

For context, the Digital Centre website states that it offers a range of government and private services locally and covers sectors including citizen services, finance, utilities, skills and other assisted digital services (Digital Centre, n.d.). National service and centre counts are not used as indicators of Dhaka-level performance.

Interpretation: The 59 Dhaka District Administration services integrated in MyGov indicate an increase in digital public service availability at the Dhaka level. The national Digital Centre and Eksheba service counts support the context that the Dhaka services are part of a larger and more varied service infrastructure, but do not prove full service coverage at the Dhaka level. Nor do the secondary sources provide a denominator indicating the proportion of Dhaka services that are completely end-to-end digital.

Score: 4 out of 5. Implementation is substantial and there is specific Dhaka evidence, but full Dhaka-wide coverage is not shown, hence a 4.

4.5.3 Service-Delivery Efficiency

MyGov offers an online platform where users can sign up, access government services and store selected profile information and documents for reuse in later applications, reducing the need to repeatedly enter or upload the same information (MyGov, n.d.). Digital Centres provide a pathway for citizens to receive assistance in accessing digital and other services in their locality (Digital Centre, n.d.). These features align with the goal of increasing efficiency of the programme. However, the secondary sources do not include a complete before-and-after dataset on the change in service delivery times, costs and frequency of visits for the relevant services under consideration.

The intervention is present and intended to increase efficiency — online applications, tracking and assisted services are described methods, not just aspirations. It is not possible to create a comprehensive, Dhaka-wide, before-and-after measure of the scale of efficiency gains in terms of time, cost, and number of visits achieved by the services reviewed. This reflects a lack of monitoring data, not that the method does not exist or does not work.

Score: 3 out of 5. The efficiency method is in place, but there is no complete Dhaka-wide measure of its scale.

4.5.4 Digital Service Adoption

MyGov is an active public-facing platform and national data indicate substantial use, so digital adoption is clearly occurring within the wider programme. However, no Dhaka-specific adoption rate or a valid denominator of Dhaka residents using MyGov or completing the selected services digitally is provided in the available secondary sources.

National use confirms that adoption is not merely theoretical, but it cannot be converted into a Dhaka-level adoption outcome. As the study is geographically confined to Dhaka, a low performance score based purely on the lack of a Dhaka denominator would confound weak monitoring with weak adoption.

Assessment: NE (Not Evaluated). National-level evidence confirms substantial use, but the available evidence is insufficient to calculate or score Dhaka-specific adoption. This is considered an evidence and monitoring gap rather than evidence of low adoption.

4.5.5 Digital Inclusion and Access

The Digital Centre model is explicitly intended to function as an inclusive, last-mile service-delivery mechanism. According to the official programme website, the centres offer local, assisted access to government information and citizen services, financial services, utilities, skills and other service areas, especially relevant for citizens who are otherwise hindered by distance, cost, information or digital-access barriers (Digital Centre, n.d.). This supports the conclusion that inclusion is built into the design of the service-delivery mechanism. However, there is insufficiently disaggregated, Dhaka-specific usage data by gender, income, disability or other vulnerability factors to assess equitable uptake.

This finding is stronger than what would be concluded based solely on the lack of data. An accessible local delivery point, with an explicit focus on underprivileged populations, and present within the city corporations, constitutes a tangible inclusion initiative. The limitation here is that Dhaka-specific, disaggregated usage data — by gender, income, disability, etc. — is not available in the secondary sources, so there is no way to measure how equitably usage is being distributed.

Score: 3 out of 5. The inclusion strategy is clear from the Digital Centre model and its presence in the city corporations, but there is insufficient measurement of Dhaka-level uptake to merit a higher score.

4.5.6 a2i Sustainability Assessment Summary

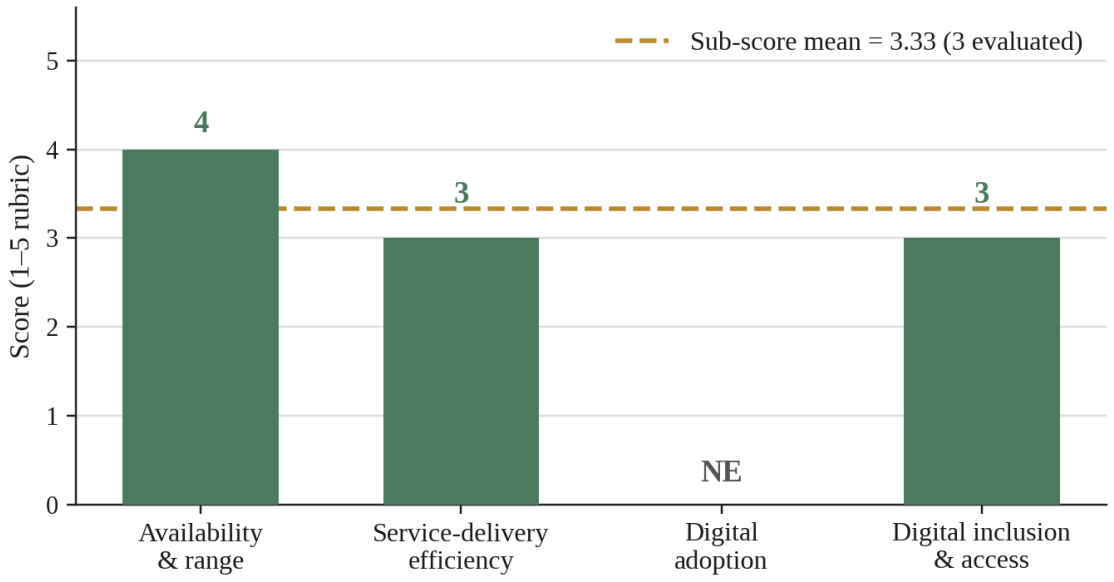
Table 4.5 summarises the four a2i indicators. Three indicators have enough evidence for numerical scoring, while digital service adoption is recorded as NE due to the absence of a Dhaka-specific adoption denominator. The resulting a2i sub-score is therefore based on only the three numerically scored indicators. The key point is not that a2i is not doing anything, but rather that service delivery and inclusion mechanisms are better documented than Dhaka-level efficiency and adoption outcomes.

Table 4.5: a2i sustainability indicator assessment

a2i Indicator	Score	Evidence-Based Interpretation
Digital service availability & range	4	59 Dhaka District Administration services integrated into MyGov; national Digital Centre/Eksheba figures provide contextual programme-capacity evidence, not Dhaka outcomes.
Service-delivery efficiency	3	Time/cost/visit-reduction mechanism is designed and operating, but comprehensive Dhaka-wide outcome measurement is incomplete.
Digital service adoption	NE	National use is documented, but no valid Dhaka-specific adoption rate/denominator is available; treated as an evidence gap.
Digital inclusion & access	3	Assisted-access model explicitly targets underserved users and extends to urban local-government settings; equitable Dhaka-level uptake is not sufficiently measured.

Source: Author's analysis, 2026

(sub-score = 3.33/5 across three evaluated indicators; digital adoption = NE)



Source: Author's analysis, 2026

Figure 4.3. a2i sustainability indicator scores (sub-score = 3.33/5 across three evaluated indicators; digital adoption = NE).

4.6 Composite Sustainability Score

There are thirteen indicators in the framework. Twelve indicators have enough evidence for numerical assessment, while a2i digital service adoption is assessed as NE since a valid Dhaka-specific adoption denominator is lacking. The equally weighted average of the twelve numerically assessed indicators is about 3.0 out of 5, placing it in the "moderate" performance range described in Chapter Three. Evidence coverage is thus 12 out of 13 indicators (about 92%). Reporting evidence coverage in addition to the composite score distinguishes performance from gaps in monitoring data.

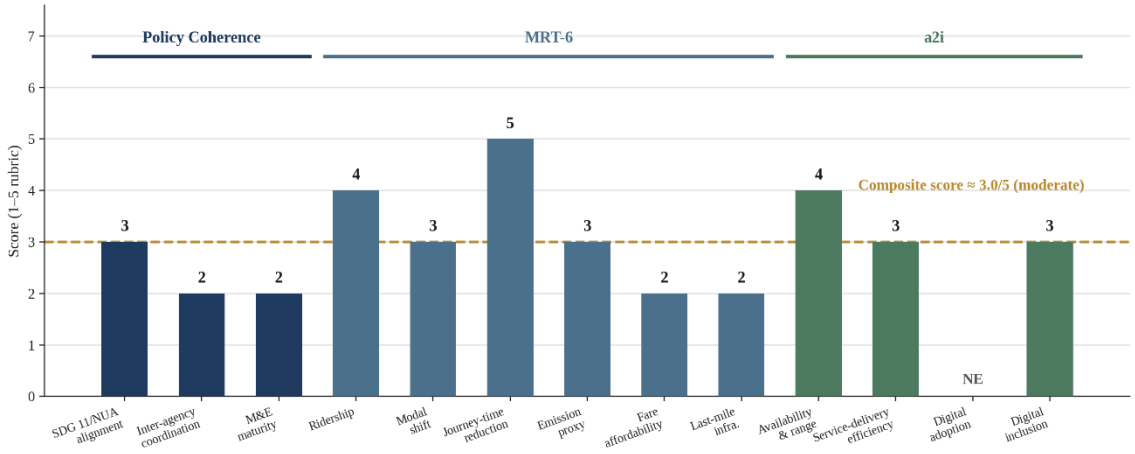
The composite should not be seen as an official sustainability rating, or as evidence that either initiative is failing. Strong evidence is available for journey-time reduction, ridership and digital-service provision; weaker evidence relates to coordination, monitoring, affordability, last-mile integration and Dhaka-level digital adoption. It is important that NE does not count against performance; it is a marker of an evidence gap, not evidence of poor performance.

Table 4.6: Composite sustainability assessment across thirteen indicators

Dimension	Indicator	Score
Policy coherence	SDG 11 / New Urban Agenda alignment	3
Policy coherence	Inter-agency coordination	2
Policy coherence	M&E system maturity	2
MRT-6	Ridership achievement	4
MRT-6	Modal shift	3
MRT-6	Journey-time reduction	5
MRT-6	Emission reduction proxy	3
MRT-6	Fare affordability	2
MRT-6	Last-mile infrastructure	2

a2i	Digital service availability & range	4
a2i	Service-delivery efficiency	3
a2i	Digital service adoption	NE
a2i	Digital inclusion & access	3
Overall	Composite sustainability score	≈ 3.0 / 5 (12 evaluated; 1 NE)

Source: Author's analysis, 2026



Source: Author's analysis, 2026

Figure 4.4. Composite sustainability indicator scores by dimension (12 evaluated indicators; one indicator classified NE; mean ≈ 3.0/5).

4.7 Findings for Research Objective Three: Implementation Gap Analysis

Research Objective three seeks to identify policy and implementation gaps and generate evidence-based recommendations. As described in Chapter three, these gaps are categorized as resource, coordination, monitoring, and policy design gaps. This typology informed by implementation theory, which emphasizes that policy results depend on the

sequence of decisions, agents, resources, and mechanisms linking policy goals to execution (Pressman & Wildavsky, 1973; Hill & Hupe, 2014).

4.7.1 Resource Gaps

The MRT-6 does not lack rail infrastructure, but rather other transportation resources that make up the supporting system, namely feeder buses, sidewalks, and stations that are not developed as effectively as the rail system itself. The a2i programme has significantly advanced digital service provision, yet there might be resource issues relating to access to devices, connectivity, and digital literacy that prevent some people from accessing digital services fully. In both cases, there are missing resource components in the supporting systems needed to convert the infrastructure and services into fully accessible public utilities.

4.7.2 Coordination Gaps

Coordination is another cross-cutting gap. MRT-6 requires coordination between rail agencies, transport planning authorities, city governments, road construction agencies, and traffic management departments; a2i necessitates coordination among central e-government portals, regional local government units, urban municipal bodies, and sectoral ministries. In the absence of such coordination mechanisms tied to clear results, citizens may still face fragmented systems even when each individual agency delivers its own services effectively, which echoes the governance problems documented in Karmaker et al. (2023) and Hossain et al. (2024).

4.7.3 Monitoring Gaps

Monitoring is the next important gap to address. To measure the sustainable performance there is no dedicated dashboard. Without standardized indicators, it is difficult to determine whether increased ridership on MRT-6 translates into reduced ticket prices, whether the growing number of e-services leads to greater inclusion, or whether environmental benefits are being achieved. Due to this monitoring gap, it is difficult to ensure accountability for the service provider and to modify the policies according to the evidence.

4.7.4 Policy Design Gaps

Several shortcomings occur because sustainability aspirations are not backed by sufficiently clear policy tools. Regarding MRT-6, the study did not uncover any regularly published fare cap linked to household income. Regarding a2i, although inclusivity is part of the programme's design, there is no consistent evidence that specific Dhaka-level targets for female users, low-income households, persons with disabilities, or slum dwellers have been set or tracked in official documents. Such shortcomings represent policy design gaps, in that the objectives are not explicitly converted into quantifiable tools and milestones.

	Resource	Coordination	Monitoring	Policy design
MRT-6	Feeder & pedestrian access uneven	Weak integration across rail, road, traffic bodies	No public dashboard for ridership/affordability/ environment	No income-linked affordability benchmark
a2i	Device/connectivity/ digital-capability gaps	Weak integration of platforms, LGIs, agencies	No Dhaka-level dashboard by social group	No Dhaka-specific inclusion targets

Source: Author's analysis, 2026

Figure 4.5. Implementation gap matrix summarising resource, coordination, monitoring, and policy-design gaps for MRT-6 and a2i.

Table 4.7: Implementation gap analysis summary.

Gap Category	MRT-6	a2i
Resource	Supporting feeder and pedestrian access has not developed as consistently as the core rail asset.	Device, connectivity, and digital-capability constraints can limit effective access.
Coordination	Mobility outcomes require stronger integration among rail, transport, road, traffic, and city institutions.	Digital service journeys require stronger integration among platforms, local government, and sector agencies.
Monitoring	No integrated public dashboard covering ridership, affordability, access, and environmental outcomes.	No stable Dhaka-level dashboard disaggregating use and outcomes by relevant social groups.
Policy design	Affordability and last-mile outcomes need clearer measurable instruments and benchmarks.	Inclusion goals need clearer Dhaka-specific targets and disaggregated indicators.

Source: Author's analysis, 2026

4.8 Chapter Summary

Chapter Four reveals a pattern that is common to both MRT-6 and a2i. MRT-6 has delivered well on the core functions that it was designed to deliver (in particular journey-time savings and the increase in ridership) but its contribution to sustainability has been limited by affordability, last-mile integration and inadequate measurement of environmental impacts.

In a2i, the programme has performed well in terms of service supply and in designing its mechanisms for inclusion, but Dhaka-specific outcome measurement of adoption, and to a lesser degree efficiency, has been relatively poor. In both cases, coordination and monitoring were found to be the most persistent weaknesses across the various indicators.

With an average of about 3.0 out of 5 across the twelve numerically assessed indicators, the overall performance is moderate, while one additional indicator (Dhaka-specific digital adoption) remains NE since the available evidence does not allow for a defensible outcome score. This combination suggests considerable progress in infrastructure and digital-service supply alongside relatively weaker governance, integration and monitoring.

CHAPTER FIVE: DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This chapter interprets the results of Chapter Four against the background of the literature and conceptual framework discussed in Chapter Two. It returns to the central research question and discusses what the indicator scores and implementation gaps mean for sustainable urban development in Dhaka. Only the implementation gaps in Section 4.7 are used to formulate recommendations, therefore the discussion does not introduce any new policy problems that were not investigated in the analysis. The chapter also reflects on the implications for future smart-city developments in Bangladesh, highlights the limitations of this study, and outlines directions for future research. Finally, I conclude the thesis.

5.2 Discussion of Key Findings

5.2.1 Progress Towards a Smart City Is Underway but Incomplete

Overall, the findings point towards MRT-6 and a2i as contributing to Dhaka's smart city. Metro makes corridors mobile faster and more reliably, while a2i expands the availability of e-services from government offices and also creates alternative assisted access options that reduce the burden of understanding and navigating bureaucracy. These are not just rhetorical victories, but meaningful ones in shaping the realities of the city.

However, the results corroborate the cautionary view that technology and/or infrastructure should not in itself constitute sustainability. As Hollands (2008) argues, 'discourses around smart-cities can easily slide into a purely technocratic agenda, focusing on the technological modernisation of cities and neglecting the importance of questions of equity, participation and broader social goals.' This concern emerges in the case of Dhaka as, even though the metro performs well technologically, a passenger could still be disadvantaged by high ticket fares or difficult access to stations, and even though a digital platform offers many services, a user might still be disadvantaged by poor access to a device, a bad connection, low digital literacy, or no access to support.

This explains why the overall score is lower than the highest-scoring single-project indicator. The overall score reflects a more comprehensive notion of sustainability, where infrastructure, governance, environmental factors and inclusiveness all count – a perspective that is aligned with SDG 11 and ISO 37122, both of which define sustainable

cities as being more than a suite of technological innovations (ISO, 2019; United Nations, 2015).

5.2.2 MRT-6: Strong Corridor Performance, Weaker System Integration

The MRT-6 results demonstrate that the project performs best when assessed as a rail transit system: it has dramatically reduced journey times, it attracts high ridership, and studies indicate that it has the potential to shift significant numbers of commuters from other modes of transport. Its 2025 record ridership is also an indicator that demand is beginning to meet the projections outlined in the strategic transport master plan, although a single-day record cannot be taken as representative of a sustainable long-term level of usage (JICA Study Team, 2015; TBS, 2025).

Yet sustainable mobility depends on the whole journey, not just the time within the train. Pojani and Stead (2015) stress that transport systems in developing cities often fail to achieve integration, affordability, and institutional capacity. The results from Dhaka are consistent with this: if passengers experience hazardous or arduous walkability, poor feeder services, or high full journey cost, then a share of the metro's positive impact will be negated – especially for lower-income travellers, who are likely to be more influenced by fares and first-/last-mile costs.

It should also be noted that the congestion result requires careful interpretation. Yamada and Jiang (2025) offer quasi-experimental evidence that MRT-6 raised vehicle speeds along the treatment corridor as operating hours and stations were added, while also cautioning that induced demand could erode some of the extra road space over time. This corroborates one of our central findings: MRT-6 is likely to help alleviate congestion, yet no single line will end Dhaka's congestion without wider network development, improved feeder services, pedestrian enhancements, and additional transport demand management.

5.2.3 a2i: A real governance mechanism but with a weak evidence base for outcome measurement

In the case of a2i, what the findings suggest is a gap between how well-documented the programme's design is and how well-documented its outcome measurement is, rather than a gap between a strong supply of digital services and a weak design for inclusion. a2i has

established a robust service-delivery architecture — including MyGov, the National Portal and Digital Centres — which suggests that digital government in Bangladesh has progressed beyond a series of discrete websites to a set of common platforms and assisted channels for accessing services.

The inclusion of 59 Dhaka district services into MyGov offers direct evidence of the relevance of this architecture to Dhaka (BSS, 2023) and the design of the Digital Centres, which have been explicitly developed to serve underserved users and which have been extended into city-corporation wards, represents a specific (if incompletely measured) mechanism for inclusion.

The key issue is not that there is no evidence of digital activity, or no evidence of a design for inclusion, but that it has proved difficult to quantify how much adoption and efficiency gains have resulted from this architecture using Dhaka-specific data. While national ICT statistics indicate continuing disparities in access to devices and the internet, a2i itself acknowledges that there is a need for assisted access for underserved groups (Digital Centre, n.d.; BBS, 2023).

There is no question that a2i has provided a large number of services that are available online, or that it has developed a model for assisted access, but these should not be considered a sufficient substitute for measuring outcomes. A more rigorous evaluation framework should report measures of active usage, successful completion, time and cost savings and user characteristics, in a privacy-conscious and disaggregated manner — which is precisely what is missing according to the discussion in Section 4.7.

From the perspective of Development Studies this distinction matters because, even though digitalisation reduces transaction costs and may increase access to public services, it also risks entrenching or exacerbating existing inequalities where people do not have the connectivity, skills, income or institutional trust needed to benefit.

Thus the policy challenge becomes not deciding whether a2i's mechanisms exist (and there is quite good evidence that they do), but rather ensuring that digital services are indeed multichannel, and that we measure, rather than assume, who is being helped. People who

want to self-serve should be able to do so; people who need support should have access to measured, supported alternatives.

5.2.4 Governance Is the Common Constraint

The key finding from the two cases is that governance is the common constraint. Even though MRT-6 and a2i are led by different organizations and are operating in different sectors, they both rely on coordination with other organizations in order to deliver sustainable results. This confirms the logic of implementation theory — Pressman and Wildavsky (1973) found that the gap between a policy decision and its result increases if implementation involves many actors and decision points, and Hill and Hupe (2014) highlighted the role of operational governance — the idea that policies are implemented through networks of organizations rather than merely through policy documents.

This means that, in Dhaka, the success of MRT-6 cannot be evaluated without the performance of the organizations that deliver road, walkway, feeder transport, traffic control and urban development at stations, while the success of a2i cannot be evaluated without the performance of the organizations that own the services and the local organizations through which people interface with the government. In Dhaka, Karmaker et al. (2023) identify governance and organizational factors as key constraints to a smart city transformation, while Hossain et al. (2024) find that sustainable urban governance and monitoring are weak at the city corporation level more broadly. This study complements that literature by providing a cross-sector view of how the same governance constraints impact both mobility and digital public services.

5.3 Policy Recommendations

The policy recommendations mentioned next are directly correlated to the gaps mentioned in Chapter Four. These recommendations focus on strengthening the sustainability contribution of the current initiatives rather than introducing new ones.

5.3.1 Establish a Dhaka Smart-City Coordination Mechanism

DMTCL, DTCA, DNCC, DSCC, the ICT Division/a2i and other related entities should gather to focus on a couple of urban priorities. It doesn't have to be a huge institution, just

a joint technical committee that has a clear mandate, regular meetings, designated focal points, and public records of their activities. They should work together on issues that a single agency is incapable of addressing independently, like station access, feeder transport integration, digital services at the locality level, and common data standards.

5.3.2 Create a Shared Sustainability Monitoring Dashboard

Dhaka needs an open dataset and a monitoring system that incorporates technical and social-environmental performance indicators. For MRT-6, these could include: ridership, reliability, total journey time, first- and last-mile accessibility, fare affordability, accessibility for persons with disabilities, and environmental performance. For a2i, they could include: number of active users, number of successful transactions, reduction in time-cost-visits, service delivery rate, use of handholding services, and inclusion indices by demographic group. These metrics should use standard definitions and reporting periods so that progress can be measured over time — directly addressing the monitoring deficiencies identified in Chapter Four, and consistent with the need for stronger urban monitoring and evaluation systems identified by Hossain et al. (2024).

5.3.3 Strengthen Fare Affordability and Integrated Ticketing

MRT-6's fare policy be evaluated using a clear affordability criterion, including assessment of transport expenditure as a percentage of income for low-income earners and students. Targeted concessions, time-of-day products, or future integrated fares with feeder modes can subsequently be considered on the basis of evidence. The purpose is not to cut all fares, but rather to ensure that the MRT's time-saving advantages are available to populations for whom recurring fares are a substantial cost.

5.3.4 Prioritise First- and Last-Mile Access Around MRT Stations

Station-area planning must be viewed as part of the transport network, not just as an urban-planning matter. DMTCL, DTCA, city corporations and road authorities should collaboratively review walking paths, intersections, feeder stops, NMT access, lighting, universal accessibility and interchange conditions around each station. Upgrades should be prioritised based on passenger traffic and safety hazards. Enhancing first- and last-mile

connectivity will expand the metro's effective service area and broaden the range of people who benefit from the project.

5.3.5 Make a2i's Adoption and Efficiency Outcomes Measurable in Dhaka

a2i should maintain its current architecture, including MyGov and Digital Centres, but should improve the measurement of outcomes, particularly adoption and efficiency, in Dhaka, where this study identifies the weakest evidence. Where legally and ethically permissible, service-use reporting in Dhaka should report active users, completion rates, and time-cost-visit savings disaggregated by gender, age band, disability, and ward without compromising privacy.

Since the Digital Centre model is already a viable inclusion mechanism, the focus should be on monitoring its equitable uptake rather than reinventing it. Low-bandwidth design, accessible interfaces, multilingual information, and assisted counters should be treated as standard service quality features, and monitored accordingly.

5.3.6 Institutionalise Citizen Feedback

Both projects could greatly benefit from enhanced visibility of citizen feedback mechanisms. MRT passengers should be able to raise complaints on station accessibility, safety, congestion, fares and interchanges through a common process linked to relevant agencies. Users of digital services should be able to report on failed transactions, unclear processes, accessibility barriers and excessive walk-ins. Publication of summary feedback and responses by agencies would improve transparency and help ensure that smart-city interventions remain citizen-centric.

5.4 Implications for Smart-City Replication in Bangladesh

The implications of these findings extend beyond Dhaka. Bangladesh is working on smart city strategies for other urban centers and the Dhaka case shows the importance of getting the institutional framework in place early instead of trying to implement it after the technologies and infrastructure are already operational. For future initiatives, coordination roles, inclusion metrics, affordability benchmarks and monitoring arrangements should be built into the project designs. In essence, replication should be based on functions and not

technologies. Secondary cities do not necessarily need the same transport or digital services models as Dhaka but they need integrated planning, strong data collection, inclusive services and feedback mechanisms. The challenge is to replicate the governance processes and not just the visible components of a smart city.

5.5 Revisiting limitations

The findings should be interpreted in the context of the limitations outlined in Chapters One and Three.

First, since this study only uses secondary data sources, the lived experiences of households, commuters or informal-settlement dwellers cannot be captured.

Second, the datasets used are reported on different periods and concepts, making direct comparisons difficult.

Third, a2i is a national program; hence it is not safe to assume that the data is equally representative of the situation in Dhaka as in the country.

Fourth, MRT-6 is a single line within an emerging network and its effects on traffic congestion, land-use, emissions and accessibility may change over time when other lines and interchanges come into operation.

These limitations are also applicable from an analytical standpoint. The non-availability of comparable disaggregated data is also an indication of the monitoring gap identified in this research. Thus, the composite scores should not be taken as the final word on the comparative strengths and weaknesses of the two programs but rather a systematic and transparent compilation of what is currently available.

5.6 Recommendations for future research

Future research should seek to validate the current findings using primary data. Surveys of households and commuters could probe issues relating to fare affordability, first-/last-mile travel, gendered mobility, disability access and the distribution of the MRT's benefits across income groups. At a station level, spatial analysis could be conducted to assess walking distance and access to feeders.

In respect of a2i, user-experience research could be carried out to compare the experience of digital self-service to assisted service, and to assess the levels of success, time-savings and potential exclusion across social groups.

There is also room for follow-up research in the form of longitudinal studies. The composite assessment could be re-done when more MRT lines are operationalized or when a2i further expands the integration of existing services onto its platform to see if the coordination, monitoring and inclusion gaps are temporary by-products of the implementation process or more deeply rooted structural deficiencies. Other studies could also explore the applicability of the framework in this study to other secondary cities to see if the same indicators hold true.

5.7 Conclusion

This research examined the degree to which MRT Line 6 and a2i e-governance program are contributing towards sustainable urban development in Dhaka and identified the policy and implementation gaps hindering their full potential. The analysis reveals that both initiatives have made important contributions. MRT-6 has led to significant reductions in travel times and an increase in passenger numbers; a2i has increased the number of digital public services offered and expanded their coverage. The positive outcomes of these smart-city initiatives demonstrate that they can play a role in improving urban life in Dhaka.

The study also reveals, however, that the gains fall short of delivering full sustainability. MRT-6 has delivered stronger outcomes as a transport mode than as a mobility solution due to the lower performance in the areas of affordability, first-/last-mile connectivity and emissions. In contrast, a2i appears stronger on service provision than on uptake and inclusion, since Dhaka-specific adoption could not be numerically assessed and disaggregated inclusion outcomes are insufficiently measured. This should be read as a monitoring and evidence gap rather than as proof of low uptake.

The average of about 3.0 out of 5 across the twelve numerically assessed indicators reflects this, while the NE status of Dhaka-specific digital adoption marks a separate monitoring gap. Dhaka has achieved considerable progress in infrastructure and digital service provision, but it is behind on governance, measurement and monitoring. Therefore, the

main policy takeaway is not simply to spend more on technology, but to improve the capacity for coordinating institutions, outcome measurement and evidence on beneficiaries.

Sustainable smart city development depends on coordinated institutions, measurable indicators of who is benefiting, and policies that address affordability, adoption and equitable access. If these factors are improved, MRT-6 and a2i can help to achieve a more inclusive, accountable and sustainable future for Dhaka

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