CHAPTER 1
INTRODUCTION

1.1 Background

The construction sector is the fifth-largest contributor to Indonesian GDP. In 2022, the construction sector contributed 9.77% of GDP (Biro Pusat Statistik, 2022). The growth of this industry is supported by the government's goal through the Ministry of Public Works and People's Housing (PUPR) to develop the nursery infrastructure to improve its connectivity.

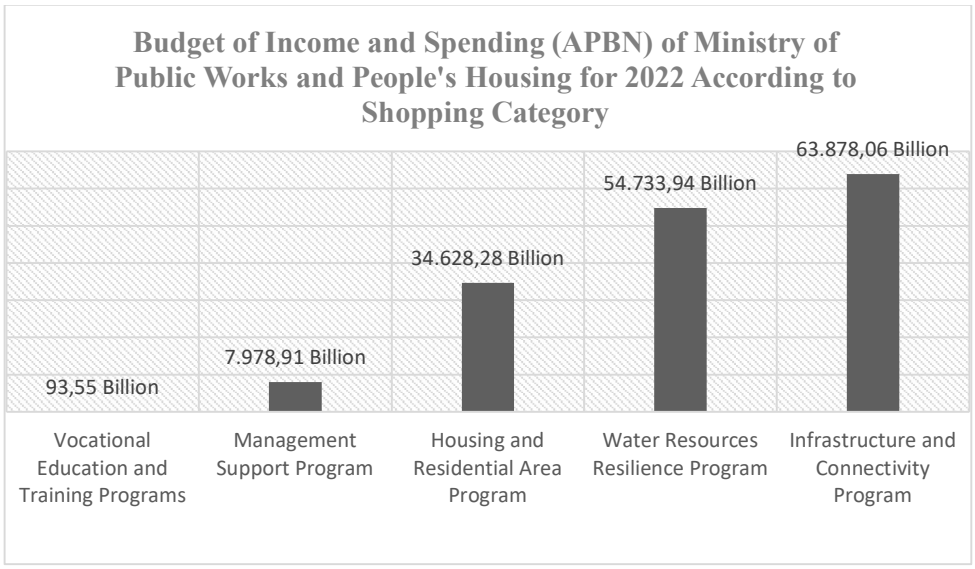

Figure 1.1 Budget of Income and Spending (APBN) of Ministry of Public Works and People's Housing for 2022 According to Shopping Category (Source: Ministry of Public Works and People's Housing Budget Report, 2021)

Based on the Ministry of PUPR Infrastructure Statistics Information for 2022, the PUPR Ministry's APBN for the 2021 Budget Year is allocated to five types of programs. Figure 1.1 shows the largest allocated budget for connectivity infrastructure programs of Rp 63,878,06 billion or 39.60% and the second highest allocation for water resource resilience programs is Rp 54,733,94 billion or 33.93%.

The increased mobility of the population is aligned with the growth and development of residential and industrial areas in urban areas. By 2022, the total population of Indonesia had reached 275,773 million, an increase of 1.13% from the previous year (Figure 1.2).

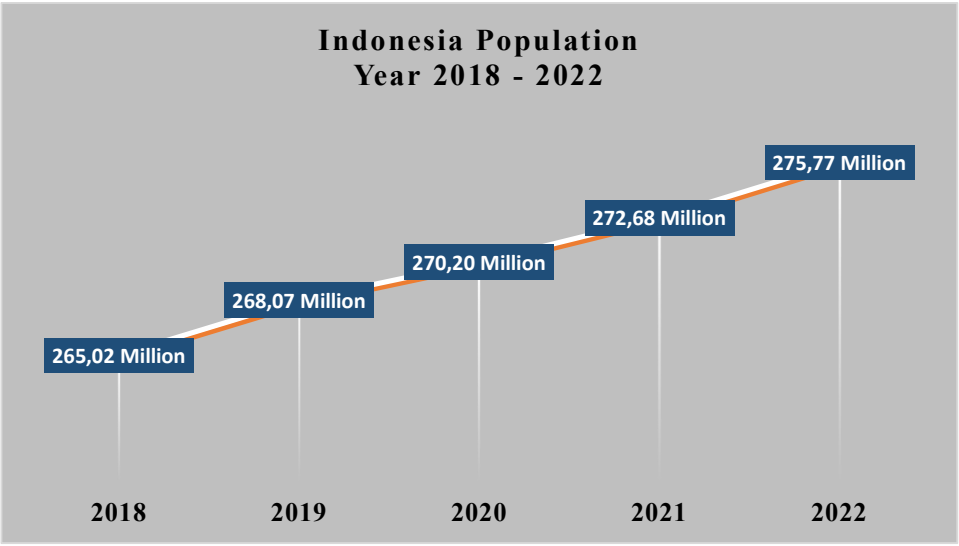

Figure 1.2 Indonesia Population 2018 – 2022 (Source : Badan Pusat Statistik Indonesia, 2022)

With increasing population growth, it requires means of transportation. It requires an effective and efficient planned urban road network management program, consistent with the level of traffic density in a road network. The road network development program across the territory of Indonesia, whether it is maintenance, improvement, or development, requires a measurable planning and in accordance with the technical standards of planning. It is hoped that with the above reference can be carried out proper construction quality and in time, as well as can provide a sense of safety and comfort for road users.

Figure 1.3 shows that the Jabodetabek (Jakarta, Bogor, Depok, Tangerang, and Bekasi) has four major Ring Road networks, including RING-1 (six DKI Tol Street), RING-2 (JIUT), Ring-3 (JORR1), and RING-4 (JORR2). All the rings pass through the existing North Port Tol, which is now known as Harbour Road I. On the harbour road I toll road, the increase in the volume of vehicles is considerable. Moreover, the harbour road I serves the majority of logistical transportation, and

becomes a very important toll road in Indonesia. With these conditions, to anticipate the increased volume and importance of the port line to support economic growth, therefore, it is necessary to increase the service capacity on Harbour roads I tolls with the construction of Harbour Road II tolls.

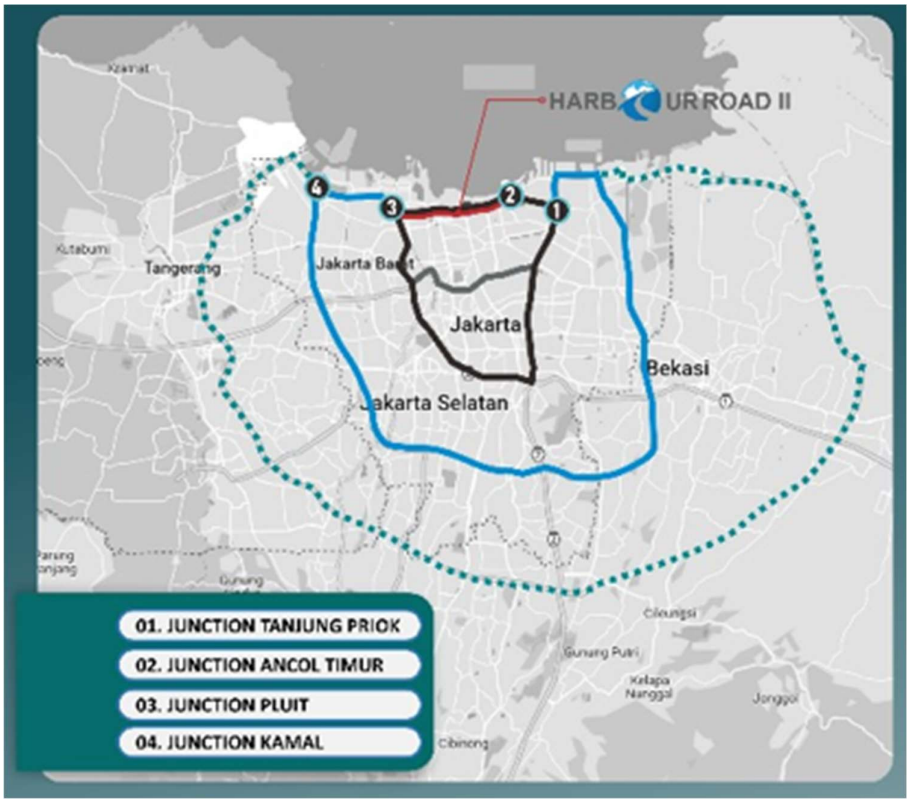

Figure 1.3 Harbor Road II Toll Plan (Source: Ministry of Public Works and People's Housing Budget Report, 2021)

Figure 1.3 also shows the Ministry of PUPR's long-term plan for the construction of toll roads in Jakarta. Tol Harbour Road II is a connection access from Tol In City Road, which is a supporting access to the area of Tanjung Priok, which is also part of the Jakarta Outer Ring Road (JORR) toll network.

Project Name : Construction of East Ancol Tol Road – Pluit (Elevated)

Project Location : Ancol – Pluit, North Jakarta

Project Owner : PT Citra Margha Nusaphala Persada, Tbk.

Contractor	: PT Wijaya Karya (Persero), Tbk.
Contract Value	: Rp 5.022.599.598.182,00
Contract Type	: Design and Build
Project Duration	: 1,825 calendar days

1.2 Background of Launcher Gantry (LG)

The Launcher Gantry (LG) was developed and used to place concrete bridge segments pre-painted after pulling forming bridges and bridge. They are specially designed for use in construction environments that limit to overcome limited land access. LG is designed to consist of lifting devices with mechanical, electrical and/or hydraulic components, and supporting structures. Due to its sophisticated nature, it is necessary to develop detailed procedures, and to limit its strict implementation by experienced operators and workers to ensure the safety of personnel working in or near machines and communities. The guidelines provide a secure operating system framework for LG's use and operation for bridge construction as a reference to all stakeholders including project clients, planners/producers, engineering consultants, residence location staff, security staff, contractors, subcontractors, supervisory and operational staff.

1.3 Launching Girder

Launching Girder is also called Launcher Gantry. Launch girders are generally design and build machines used in precast post-tensioned bridge construction. Consisting of lifting equipment and supporting structures for lifting precast beams and precast bridge segments in a position to assemble. A launch girder typically consists of a main frame girder (“beam”) and a lifting device that can move horizontally across the frame while holding/lifting precast beams, bridge sections and/or work platforms for assembly.

Lifting Frames Lifting frames are generally designed and manufactured machines that are used in segmental bridge construction. It consists of a lifting device and a metal structure to lift the bridge segments into position for assembly.

Some LG are mobile machines moving forward or backward on a connected bridge deck, and are anchored to the bridge deck when they reach their working position.

The lifting frame usually consists of two main cantilever beams attached to the main structure and a lifting device that can move horizontally along the cantilever beams while holding/lifting the bridge segments for assembly. Suspension bridge segments can be moved horizontally or vertically by machines during assembly.

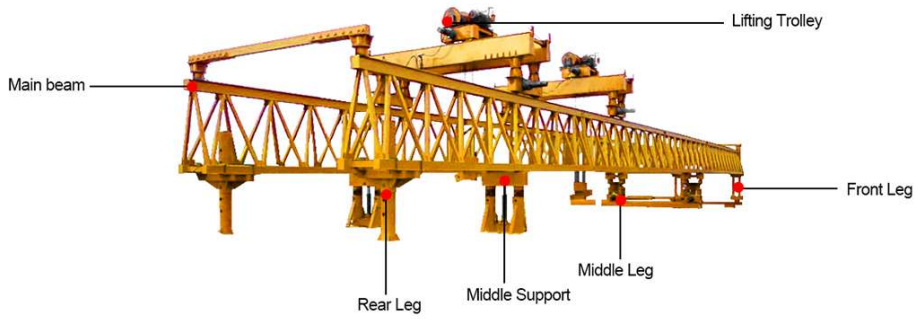

Figure 1.4 Launcher Gantry Parts (Source: Comtec's Manual Book)

1.4 Research Problem

Construction of bridge road structures in urban areas, especially in DKI Jakarta Province, has its own challenges. Limited land area or space, underground and overhead utilities, availability of tools, limited investment value of work owners are some of the challenges in implementing construction. The Ancol Timur-Pluit (Elevated) Toll Road Construction Project or better known as the Harbor Road II Project is in the North Jakarta area which is geographically close to the sea and is a logistics center on the island of Java.

With these challenges, Harbor Road II was designed with an elevated concept using the work area around the Existing Toll Road owned by the Employer (CMNP), namely Harbor Road I. To minimize utility interruptions, the bridge span was made as long as possible. Harbor Road II has an end to end structure plan of 9.7 km with a total elevation of up to 22 km. The typical bridge structure uses a

Segment Box Girder (SBG) span type with a span of 47 m. With a toll road concept with 3x2 lanes, a box girder width of 14.3 m is required, making it the widest non-ribbed box girder construction in Indonesia currently.

Table 1.1 List of Launcher Gantry Ownership in Indonesia

No.	Ownership	Capacity	Brand	Number of Units	Max. Span
1.	WITON	830 Ton	Tolian	1	50 m
2.	WITON	650 Ton	Liando	5	40 m
3.	GI	850 Ton	Liando	1	50 m
4.	GI	850 Ton	Tolian	1	50 m
5.	WIKON	1,000 Ton	Comtec	1	50 m
6.	WIKON	800 Ton	Comtec	1	50 m
7.	WIKON	650 Ton	Comtec	3	43 m
8.	PP	860 Ton	Comtec	2	50 m
9.	PANCANG SAKTI	860 Ton	Comtec	1	50 m
10.	JAKON-ADHI KSO	860 Ton	Comtec	7	50 m

Source: Wika Supply Chain Management, 2023

The erection concept for the box girder structure uses a span by span system with Launcher Gantry heavy equipment. However, the main challenge is that the total load of one span reaches 1,000 tons, where the equipment currently available in Indonesia is only one tool (according to table 1.1), whereas in the planning for the construction of Harbor Road II, which must be completed in 36 months, it requires a total of two Launcher Gantry. Regarding this challenge, by looking at the Launcher Gantry ecosystem in Indonesia which is dominated by a LG capacity of 860 tons, a decision is needed to purchase a Launcher Gantry with a capacity of 1,000 tons imported from abroad which is needed immediately for the Erection Box Girder.

1.5 Research Question

Based on the information and problem statement above, this study would like to answer these questions

1. What operational strategy should Wika management implement to efficiently and effectively acquire the 1,000 Ton Launcher Gantry for the Harbor Road 2 Toll Road Project?

2. How is the feasibility of investing in the 1,000 Ton Launcher Gantry on the Harbor Road 2 Toll Road Project of Wika?
3. How is the impact of sensitivity toward cost changes on the feasibility of investing in the 1,000 Ton Launcher Gantry for the Harbor Road 2 Toll Road Project of Wika?
4. How does the 1,000 Ton Launcher Gantry investment help Wika in supporting the aspects of the Sustainable Development Goals?

1.6 Research Objective

Based on the Problem Formulation explained in 1.5, the objectives of this study are as follows:

1. To analyze and evaluate the operational strategy that Wika management should implement to efficiently and effectively acquire the 1,000 Ton Launcher Gantry for the Harbor Road 2 Toll Road Project.
2. To understand and evaluate the feasibility of investing in the 1,000 Ton Launcher Gantry on the Harbor Road 2 Toll Road Project of Wika.
3. To analyze the impact of sensitivity toward cost changes on the feasibility of investing in the 1,000 Ton Launcher Gantry for the Harbor Road 2 Toll Road Project of Wika.
4. To find out the 1,000 Ton Launcher Gantry investment help Wika in supporting the aspects of the Sustainable Development Goals.

1.7 Scope and Limitation of The Study

In Indonesia, there is only one Launcher Gantry that has a single span load capacity of up to 1,000 tons and PT Wijaya Karya Rekayasa Konstruksi (WIKON) which is a subsidiary of PT Wijaya Karya (Persero), Tbk is the only company that has a Launcher Gantry with a load capacity of up to 1,000 tons. Therefore, this study will focus on the investment of the 1,000 Ton Launcher Gantry by PT Wijaya Karya (Persero), Tbk. on the Harbor Road 2 Toll Road Project in 2025. It is assume that give the many issues discussed are still open to interpretation and can change at any time according to market conditions or regional regulations.

1.8 Previous Research

Numerous studies, including the Capital Budgeting Technique and the have been carried out in order to ascertain the value of the projects in question.

Table 1.2 List of Previous Study

No	Author & Research Title	Variable	Findings
1.	Hollis, M., Daryanto, W. M., & Zulkifli, M. (2022) Strategic Acquisition of Automated Stacking Machine for Built Core Production: A Case Study Of PT Trafcomp Indonesiaperkasa.	Payback Period, ROI, Weighted Average Cost of Capital, NPV, Profitability Index, and Internal Rate of Return, Monte Carlo	Using SWOT analysis and capital budgeting technique to calculate with the estimated investment of new machine. Positive NPV and Payback Period less than 1 year, SDG goal no. 5 Analysis, sensitivity analysis and NonMonetary Analysis
2.	Merzy, A. M., & Daryanto, W. M. (2018). Financial Feasibility Studies for Perusahaan Gas Negara (PGN) Project: A Case Study of City Gas Project in Indonesia for The Period of 2018-2038.	Payback Period, ROI, NPV, Profitability Index, Discounted Payback Period, IRR, PESTEL	Using Pestel Analysis to help company to considerate the feasibility of the projects. The result of pestel and capital budgeting analysis is acceptable. Payback Period less than 5 yeas ROI more than 10%
3.	Mentari, D., and W. M. Daryanto (2018) Capital budgeting model and sensitivity analysis of the project feasibility in Vietnam for the period of 2019-2037.	NPV, IRR, WACC, Profitability Index, and Payback Period, ROI	ROI of 23%, higher than the expected ROI. A positive NPV with the NPV Index resulted in 144.59 percent and an IRR rate of 22.10%, which was higher than

			the 9.7 percent discount rate.
4.	Irawati, W., & Daryanto, W. M. (2018). The Application of Capital Budgeting Model for Cost Efficiency in Distribution Pipeline: Case Study in Greenland International Industrial Center (GIIC) Area Block B.	Payback Period, NPV, Profitability Indeks (PI), Discounted Payback Period, and IRR.	Payback Period 3.41 years, RoI 33,18%, NPV IDR 10,198,232,570, Profitability Indeks 12.74%, Discounted Payback Period 4.40 years, and IRR 16.7%.
5.	Irawati, W., & Daryanto, W. M. (2018). The Application of Capital Budgeting Model for Cost Efficiency in Distribution Pipeline: Case Study in Greenland International Industrial Center (GIIC) Area Block B.	IRR, NPV, Payback Period, ROI, Monte Carlo Analysis, sensitivity analysis and Non-Monetary Analysis	IRR 29.5%, NPV IDR68,210,772,005.06. Payback Period 10 Year, ROI 52%, SDG goal no. 12

Table 1.2 demonstrate that prior research on capital investment analysis has mostly concentrated on quantitative analysis through the use of capital budgeting, in addition to non-monetary and strategic assessments. Research on investments in 1,000 Ton LG construction equipment for construction projects hasn't been done, though. Since 1,000 Ton LG construction equipment is currently unavailable in Indonesia, the author has chosen to investigate PT Wijaya Karya (Persero), Tbk., a construction company, in order to determine whether it would be feasible to acquire it.

1.9 Benefit of The Study

The following is an explanation of this study's advantage:

1. Theoretical Contribution

   Future researchers are encouraged to use this study as a reference when integrating non-monetary, quantitative, and strategic approaches in capital investment decision-making across various industries.

2. Practical Contribution

   PT Wijaya Karya (Persero), Tbk. is required to undergo a comprehensive investigation to assess the feasibility of the 1,000 Ton LG investment.

1.10 Thesis Structure

This thesis is structured into five chapters, each designed to guide the reader through the research process systematically. The content of each chapter is as follows:

Chapter I: Introduction

This chapter presents the foundational aspects of the study, outlining the essential components required for the investigation. It includes the research background, company context, problem statement, research questions, research objectives, scope of the study, contributions to prior research, significance of the study, and an overview of the thesis structure.

Chapter II: Conceptual Framework and Literature Review

This chapter provides a comprehensive review of the theoretical framework and relevant literature, which serves to guide the direction of the research.

Chapter III: Methodology

This chapter details the research methods applied to analyze the problem under study, outlining the approach and techniques used.

Chapter IV: Data Analysis

This chapter presents the analysis of the collected data, including insights from interviews, capital budgeting calculations, sensitivity analysis, and non-monetary evaluation. It also addresses each research question with corresponding answers derived from the data.

Chapter V: Conclusion and Recommendations

The final chapter offers a summary of the conclusions based on the analysis and provides recommendations for the company, as well as suggestions for future research in this area. This organization ensures a logical flow that supports a clear understanding of the research and its findings.