

**Retain or Sell? An Occupancy-Based Financial Analysis
of Crawler Crane and Excavator Ownership at Company
ABC**



INDIVIDUAL PROJECT THESIS

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**A THESIS
Submitted in a partial fulfilment of the requirements for the
degree of Master of Business Administration**

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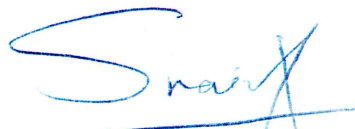
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Retain or Sell? An Occupancy-Based Financial Analysis of Crawler Crane and Excavator Ownership at Company ABC

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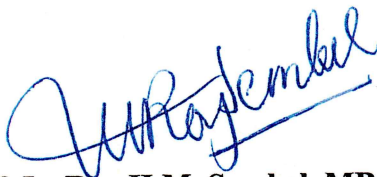
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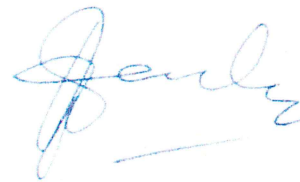
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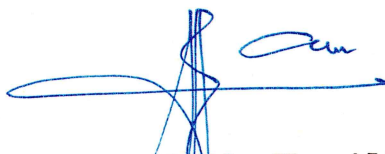


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NON-PLAGIARISM DECLARATION FORM

This Thesis is a presentation of my original research work. Wherever contribution of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions.

Also, this work is being submitted in partial fulfilment of the requirements for the Master of Business Administration degree and has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Jakarta, September 25th 2026



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Abstract

Company ABC, a specialist geotechnical contractor in Indonesia, owns a fleet of nine crawler cranes and twelve excavators. As the Indonesian project pipeline weakened from 2025, fleet occupancy declined from 73.5 per cent in 2024 to 35.6 per cent, creating a need for a structured financial basis to assess whether continued ownership of the existing fleet remains justified. This study develops a unit-level decision framework that identifies the minimum occupancy required for each machine to remain financially preferable to disposal and subsequent rental when required. An incremental cash-flow model is applied over a two-year horizon to all twenty-one units, comparing two mutually exclusive alternatives: retaining each machine or selling it and renting an equivalent machine when needed. Because operating contribution is assumed to be identical under both alternatives, the analysis focuses on the financial differences arising from rental costs avoided by ownership, ownership cash costs, the depreciation tax shield, and the capital opportunity cost of retaining the asset. Break-even occupancy is established by setting the incremental cash flow between the two alternatives to zero. Historical deployment records from January 2022 to June 2026 are used to establish actual occupancy, while the 2027–2028 project pipeline is evaluated under realistic and pessimistic demand scenarios. The results indicate break-even occupancy levels ranging from 13.4 to 25.2 per cent across the fleet, compared with historical occupancy of 65.9 per cent. Under the realistic scenario, retaining the fleet generates an incremental value of IDR 17,116 million compared with disposal, with all twenty-one units remaining above their respective break-even thresholds. Under the pessimistic scenario, retention generates an incremental value of IDR 5,425 million, with all twenty-one units likewise remaining above their thresholds. Sensitivity analysis identifies only one marginal exception: a mid-size crane becomes approximately IDR 0.4 million less attractive to retain when rental market prices are assumed to be 10 per cent below quotation. Rather than prescribing a single fleet action, the study provides Company ABC's management with a transparent and repeatable unit-level framework for evaluating fleet retention and potential divestment as demand conditions change. The findings also extend the Indonesian equipment-management literature by shifting the focus from the conventional pre-acquisition own-versus-rent decision towards the post-acquisition retain-or-divest decision for an existing equipment fleet.

Keywords: break-even occupancy; incremental cash flow; net present value; retain-or-sell decision.

CHAPTER 1

INTRODUCTION

1.1 Industry Background

Foundation work is one of the most critical early stages of any construction project. Before any structure can rise above ground, the sub-surface must be prepared and stabilised through specialist geotechnical works such as bored piles, diaphragm walls, and soil improvement. These works determine the safety, stability, and long-term integrity of the entire structure, and any deficiency at this stage is costly and difficult to correct later. Procuring the equipment for these activities presents a complex problem that directly affects project timelines, costs, and overall success (Rashid et al., 2006).

Unlike the general-purpose machinery used in above-ground construction, foundation contractors rely on highly specialised and very expensive heavy equipment, such as large drilling and piling rigs. Selecting and acquiring the appropriate equipment contributes directly to operational efficiency and offers competitive advantages, including financial stability and better technical capacity (Samee & Pongpeng, 2016). Because a single rig represents a substantial capital commitment, the way a contractor acquires its equipment strongly influences the company's cost structure, capacity, and competitiveness. Procurement decisions therefore play an important role in determining the success and efficiency of the overall project, as they influence its cost, quality, and time (Bolomope et al., 2022).

Within the procurement process, one of the first decisions is how the equipment will be acquired. Traditionally this is framed as a buy, rent, or lease decision (Gransberg & Rueda-Benavides, 2020). For a specialist foundation contractor, purchasing rigs outright requires an amount of capital that is difficult to justify or sustain, so equipment is instead financed through instalments, effectively a form of ownership paid for over time, or obtained through short-term rental. Once a contractor already owns a fleet, a further and equally important question arises: whether that level of ownership remains justified as market conditions change. Owned equipment commits the company to fixed costs

regardless of use, whereas rental is incurred only when equipment is deployed; each carries distinct advantages in terms of cost, control, and flexibility (Gransberg, Popescu, & Ryan, 2006).

Several pressures have made this decision harder. Public procurement is awarded largely on lowest price (Latumaerissa, 2025), while contractors depend on imported specialised equipment whose local-currency cost has risen with rupiah depreciation (GBG Indonesia, 2025; Universitas Gadjah Mada, 2025) and with equipment price inflation (Statista, 2024). Tightening emission requirements (Un-Noor et al., 2022) and tender age limits, commonly set at around five years (Directorate General of Highways, 2025), shorten the period over which a machine remains both technically and administratively usable, accelerating obsolescence in a way that the purchase price alone does not capture (Mao & Zaleski, 2011). Together these compress margins and shorten the useful economic life of the asset.

Where price competition is intense and the pipeline has thinned, the level at which a contractor owns equipment ceases to be a routine operational matter. Whether an owned fleet remains financially justified, or should be restructured, becomes a decision that determines whether the contractor can protect its margins.

1.2 Company Background

Company ABC is a specialist geotechnical contractor operating in Indonesia. It is the local subsidiary of a long-established European construction group and has more than thirty years of experience in specialist foundation engineering, combining the technical expertise and machinery resources of its international parent with local project delivery. Over these decades the company has built a strong reputation in the Indonesian market for complex, technically demanding foundation works.

The company undertakes a broad range of geotechnical works, including bored piles, diaphragm walls, soil improvement, and micropiles on projects distributed across Indonesia. Its projects span infrastructure and building developments in different regions of the archipelago, which means that its equipment must be mobilised and deployed across geographically dispersed sites.

The core production assets for these works are its drilling rigs, of which the company currently owns eleven. In normal field operation, each drilling rig requires the support of one crawler crane and one excavator to sustain production, so the drilling fleet effectively defines the company's need for these two categories of support equipment.

Against this requirement, Company ABC owns nine crawler cranes and twelve excavators, and these twenty-one units are the focus of this study. How each unit was acquired, whether purchased outright or through bank instalments, does not affect the analysis; Section 3.7 sets out why. The study addresses equipment the company already owns and asks whether continuing to own it is worth more than the alternative available at any time, which is to sell it and hire an equivalent machine when one is needed.

Holding a unit generates cost whether or not it is deployed. Insurance and repair continue, and the capital committed to the machine is unavailable for any other use. A unit that is not deployed therefore records cost without matching revenue in the equipment profit-and-loss (P&L) statement maintained by the accounting and finance department. Decision-making based on rational, cost-based analysis is positively associated with financial performance, whereas intuition-driven choices are not (Kaufmann, Wagner, & Carter, 2017).

These implications are magnified by current market conditions. Although the Indonesian construction market continues to grow, its expansion has slowed and become uneven, and the project pipeline is thinner than in the infrastructure-intensive years, so equipment increasingly stands idle. Under these conditions, management recognises the need for a structured analysis to determine whether the current level of ownership is still optimal, rather than continuing on established habit.

1.3 Problem Background

The core problem addressed in this thesis is that Company ABC needs a structured, evidence-based framework to judge whether its ownership of crawler cranes and excavators is financially optimal under current conditions. Ownership decisions were shaped by past demand, when a busy project pipeline kept

equipment continuously deployed, but market growth has since slowed and the pipeline has thinned, so the company now requires a clear basis to determine whether the current fleet still earns its keep.

The symptom is occupancy. Geotechnical work is project-based and short in duration, with individual foundation projects typically lasting two to eight months. When large infrastructure projects were abundant, back-to-back demand kept the crawler cranes and excavators consistently deployed. Under current conditions the pipeline is thinner and units increasingly stand idle between assignments. Because a unit's ownership costs continue while it is idle, this under-occupancy shows up directly as a loss in each unit's equipment P&L, and the business has read those losses as evidence that it owns too much equipment.

That reading has never been tested. The loss reported in an equipment P&L includes costs that disposal would not avoid, and excludes the price the company would pay to hire the same machine back. The question management actually faces is different: at what level of occupancy does an owned crawler crane or excavator earn more than it would by being sold and rented back when needed, and does forecast occupancy justify retaining the fleet as it stands?

1.4 Research Questions

To answer that central question, the study addresses three supporting research questions:

1. What is the break-even occupancy of each crawler crane and excavator, that is, the occupancy at which retaining a unit and selling it are worth the same?
2. What is the forecast occupancy for each capacity class over 2027 and 2028, and how does it compare with those thresholds?
3. Combining the thresholds and the forecast, should the company retain or partly sell its fleet?

1.5 Research Objectives

The objectives follow directly: to establish each unit's break-even occupancy from its own cash flows; to compare forecast occupancy against those thresholds under a pessimistic and a realistic demand scenario; and to recommend on that basis whether the fleet should be retained or partly sold, together with a decision framework the company can reapply as the pipeline changes.

1.6 Significance of the Study

Academic significance. Existing research on equipment acquisition concentrates on the buy, rent, or lease choice made before an asset is acquired, and gives less attention to the retain-or-divest decision for equipment already owned, particularly in specialist foundation engineering and in an emerging-market context. This study extends that literature by deriving a per-unit break-even occupancy from an incremental cash-flow comparison against the market rental alternative.

Practical significance for Company ABC. The study replaces intuition with a unit-level threshold that can be recomputed whenever resale values, rental rates, or the pipeline change, and that shows which units earn their keep and which do not.

1.7 Scope and Limitations

The study is a single-case analysis of Company ABC and addresses the retain-or-sell decision for equipment already owned rather than the initial choice to buy, rent, or lease. It covers the nine crawler cranes and twelve excavators; the eleven drilling rigs are context only, since they define the field requirement for this support equipment but are not themselves in question. Inputs are the per-unit equipment P&L for January 2022 to June 2026, net book values, management estimates of resale value, and market rental quotations by capacity class.

Several limitations follow. The analysis relies on internal records, so its accuracy depends on their completeness and reliability. Occupancy is measured as billable weeks against weeks available, which captures whether a unit was earning but not the intensity of its use within a week. The two-year horizon matches the

forecast horizon but gives terminal value a large share of the result, so the findings should not be extrapolated to a longer holding period. The findings are specific to Company ABC and are not statistically generalisable, although the framework is transferable to other equipment categories and other firms. Section 5.3 sets out the limitations in full, once the results are in view.

1.8 Structure of the Thesis

The thesis has five chapters. Chapter 1 sets out the business context and the research questions. Chapter 2 reviews the evidence on equipment ownership, idle cost, and the break-even logic, and states the research framework. Chapter 3 specifies the incremental cash-flow model, defines every symbol in it, and sets out the data, the forecast, and the decision rule. Chapter 4 reports the results under both demand scenarios: the break-even occupancy of every unit, the decision each scenario implies, the operational constraints, and the sensitivity analysis. Chapter 5 draws the conclusions and sets out the decision facing the board.

CHAPTER 2

PROJECT DESCRIPTION (EVIDENCE REVIEW)

2.1 Strategic Procurement and the Equipment Decision

Equipment decisions influence project cost, quality, and time (Bolomope et al., 2022). The purchasing literature concentrates on how an asset is acquired (Van Weele, 2014), on whether a capability should be sourced internally or externally (Nikolarakos & Georgopoulos, 2001; Gottfredson, Puryear, & Phillips, 2005), and on the criteria by which a machine is selected (Waris et al., 2019). An equally consequential question arises once a fleet is already owned, namely whether continued ownership remains justified as conditions change. That is the decision Company ABC faces and the one this study addresses.

2.2 Buy, Rent, or Lease

Equipment can be bought, rented, or leased, and the choice depends on financial position and intensity of use (Gransberg & Rueda-Benavides, 2020; Gransberg, Popescu, & Ryan, 2006); leasing is the common route where capital is scarce, as it is in most emerging economies (Al Sugheyer et al., 2009). For this study the acquisition route is settled history, because the fleet is already owned. What matters is the alternative that remains available at any time, which is renting. A rented machine is charged only while in use and costs nothing when idle (Gransberg, Popescu, & Ryan, 2006; Griffin, 2002), and it transfers part of the maintenance burden to the supplier (Fitton et al., 2008). The market rental rate is therefore the opportunity cost against which continued ownership is measured throughout this study. Its drawbacks are a higher unit cost when equipment is used frequently (Pham et al., 2020), and uncertain availability and rates at peak demand (Hammad, 2023; Jung et al., 2006).

2.3 Ownership Cost, Idle Cost, and the Occupancy Problem

Owning equipment generates recurring cost regardless of use: depreciation, insurance, and repair and maintenance (Day & Benjamin, 1991; Gransberg, Popescu, & Ryan, 2006; Peurifoy, Schexnayder, Shapira, & Schmitt, 2018). Over a machine's life these accumulate into a total cost of ownership far

larger than the purchase price (Woodward, 1997), and a growing share of it is maintenance spending the owner must plan and fund (Liu, Liu, & Yang, 2024). These are largely fixed costs, which do not vary with the level of use, whereas rental is a variable cost incurred only while equipment is in use (Horngren, Datar, & Rittenberg, 2015). The distinction is decisive when work is intermittent: an idle owned machine still incurs its fixed cost with no matching revenue, whereas a rented machine would incur nothing (Nunnally, 2007). Idle cost is therefore the central economic argument for renting when utilisation is low.

Two of these items require care in a forward-looking decision. Depreciation allocates a past expenditure rather than a current cash outflow, so it is treated here not as a cash cost but through its effect on taxable income. Financing is excluded altogether, because the obligation is identical whether a unit is retained or sold and therefore cancels from the comparison; charging both depreciation and instalments would count the same machine twice. Sections 3.6 and 3.7 set out both treatments.

2.4 Occupancy, Break-even, and the Retain-or-Sell Decision

Whether owning is worth more than renting depends on how much the equipment is used. Use is measured here as occupancy, the share of available weeks in which a unit is on hire and billing (Gransberg, Popescu, & Ryan, 2006).

The break-even occupancy is the level of use at which the two alternatives are worth the same. The concept descends from cost-volume-profit analysis (Horngren, Datar, & Rittenberg, 2015), but the threshold used here is not the accounting one. An accounting break-even asks whether a unit's revenue covers its allocated costs, so that its P&L reads zero. That is not the question management faces, because a machine already owned and largely written down carries allocated costs that selling it would not avoid. The decision break-even asks instead whether the capital tied up in the machine earns more by staying there than by being released. It is the occupancy at which the present value of retaining the unit equals the present value of selling it and renting an equivalent when required, and it follows the standard principle that only cash flows which differ between the alternatives are relevant to the choice (Fabozzi & Peterson,

2003). Above that threshold ownership pays; below it, disposal does. Locating each unit's forecast occupancy relative to its own threshold is the analytical core of this study.

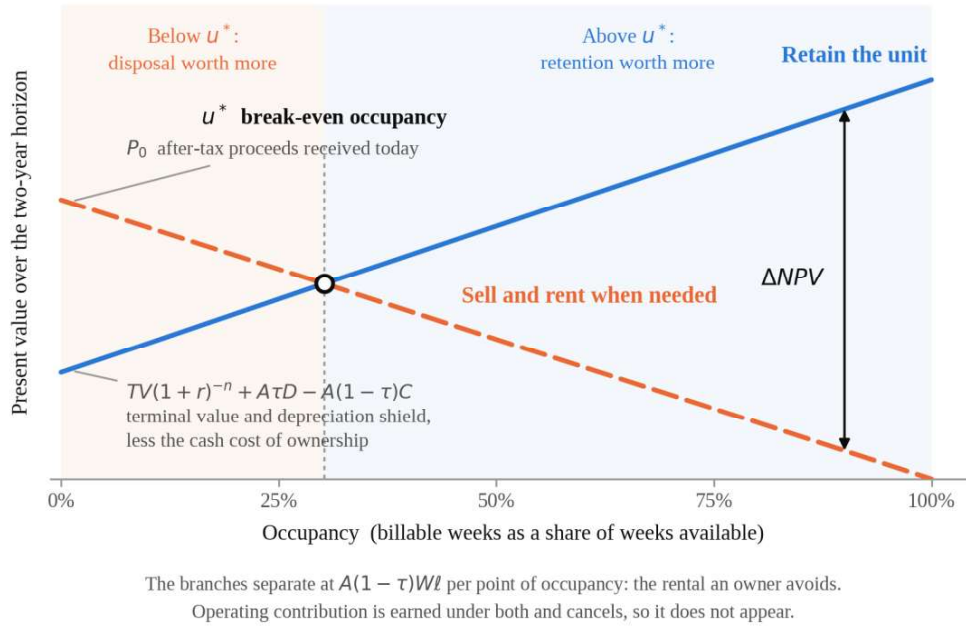


Figure 2.1 Break-even occupancy

2.5 Market Context

The decision depends on the demand the fleet will face. Indonesia's construction sector continues to grow, by about 4.1 per cent in real terms in 2025 and at a forecast compound rate near 5 per cent through 2029 (GlobalData, 2025), but growth is uneven and the rupiah has depreciated, raising the price of imported equipment (Arizton, 2026). The wider economic outlook for 2026 is one of tighter liquidity and slower private investment (CRIF, 2025), and the result is margin pressure with intense price competition (Turner & Townsend, 2025). Under these conditions a contractor can no longer rely on a full pipeline to keep owned equipment occupied. This is the condition that makes idle capital decisive, and it is the basis for the pessimistic scenario tested in Chapter 4.

2.6 Occupancy Forecasting and Scenario Analysis

Because the decision concerns the future, the cost analysis must be paired with a view of expected demand. Where the historical record is short and the

driver is a project pipeline rather than a stable time series, judgemental and explanatory methods are preferred to extrapolation (Makridakis, Wheelwright, & Hyndman, 1998). A single point forecast would also overstate precision when the pipeline is only partly known, so the study uses scenario analysis, constructing internally consistent views of the future rather than one prediction (Schoemaker, 1995). Occupancy is projected under a pessimistic and a realistic scenario, allowing the decision to be tested for robustness across the range that matters.

2.7 Previous Research

Several studies, particularly in Indonesia, have examined the choice between owning and renting heavy equipment. Their findings consistently show that the answer depends on how intensively equipment is used rather than on ownership as a matter of principle, which provides direct empirical support for this study's cost-and-occupancy approach. Table 2.1 summarises the most relevant studies, their focus, and how they differ from the present study.

Table 2.1 Previous research on the own-versus-rent decision and its difference from this study

Study	Focus and key finding	Difference from this study
Ganec Swara (2025) Pemenang–Bayan road widening, North Lombok	Compared owning versus renting per equipment type; owning was cheaper for excavators (saving about 13.5 to 26 per cent) but renting was cheaper for the vibro compactor.	Single project and equipment-type level; this study analyses 21 individual units over 2022 to 2026 using actual P&L.
Jurnal Konstruksi (2019) Ciplaz Garut project	Used NPV and IRR over a two-year horizon; buying gave a negative NPV while renting gave a positive NPV, making renting more economical.	Forward-looking estimates for a single project; this study uses realised historical costs and adds a per-unit break-even occupancy.
Annisa, Aulady, & Choiriyah (2023) Frontage project, Sidoarjo	Analysed the buy-or-rent decision for an excavator on one project.	Pre-acquisition, single-asset decision; this study addresses the retain-or-sell decision for a fleet the company already owns.
ter Brake (2025) Dutch construction industry	Case study of buy, rent, or lease decision-making; found the decision is made largely on utilisation expectations and available capital rather than on a formal model.	Pre-acquisition decision in a mature market; this study supplies the formal per-unit threshold that case found to be missing in practice.

Source: author, from the studies cited.

Across these studies, two patterns stand out. First, the own-versus-rent outcome varies by equipment and by utilisation, confirming that the decision must be taken unit by unit. Second, all of them compare owning against renting for

equipment yet to be acquired, using a single project's estimates. The present study differs by working from several years of actual per-unit P&L and by addressing the retain-or-divest decision for equipment already owned, extending the Indonesian literature from a pre-acquisition question to the ongoing management of an existing fleet.

2.8 Research Framework

The framework has two stages. In the first, each of the twenty-one units is valued under two mutually exclusive branches, retained or sold and replaced by rental when needed, over a two-year horizon; the difference between the branches is the incremental value of retention, and setting it to zero gives the unit's break-even occupancy. In the second, forecast occupancy for each capacity class is compared against those thresholds under two demand scenarios. Units whose forecast occupancy exceeds their threshold are retained; those below it are candidates for disposal, subject to an operational retention floor set at the fleet's peak concurrent deployment. The result is then tested against the assumptions that carry the most weight. Chapter 3 specifies each stage.

CHAPTER 3

METHODOLOGY

3.1 Research Approach and Design

The study is quantitative and takes the form of a single-case analysis of Company ABC. The research question is measurable: it asks at what occupancy an owned unit is worth more than the rental alternative, and whether forecast occupancy justifies retaining the fleet. Answering it requires valuing cash flows from the company's records rather than interpreting opinions.

The design is descriptive and comparative rather than inferential. It does not test hypotheses across a sample but values a defined set of assets and compares each against a threshold computed from its own cash flows, producing a decision framework tailored to Company ABC.

3.2 Data and Data Source

The study uses secondary quantitative data from five sources. The per-unit equipment P&L maintained by the accounting and finance department covers January 2022 to June 2026 and reports monthly revenue and the costs of holding each unit. Monthly deployment records give billable weeks per unit per year. The fixed-asset register gives net book value per unit. Management provides an estimated resale value per unit. Suppliers provide market rental quotations by capacity class, inclusive of mobilisation.

No primary data collection is required. Where a record requires interpretation, for example to confirm how a unit's status is recorded in a given month, this is clarified with the accounting and finance department.

3.3 Object of Analysis

The object of analysis is the company's complete population of the two equipment categories under study: all nine crawler cranes and all twelve excavators, giving twenty-one units. No sampling is applied; because the population is small and fully documented, the study uses complete enumeration and analyses every unit. The eleven drilling rigs are excluded and considered only

as context, since they define the field requirement for the support equipment but are not themselves subject to the retain-or-sell decision. Table 3.1 lists the variables taken for each unit.

Table 3.1 Variables taken per unit

Variable	Definition	Source
Billable weeks per year	Weeks in which the unit was on hire and generating revenue.	Monthly deployment records
Operating contribution per billable week	Annual revenue attributable to the unit divided by its annual billable weeks.	Equipment P&L
Annual insurance	Insurance premium charged to the unit.	Equipment P&L
Annual avoidable repair and maintenance	Repair and maintenance that would cease if the unit were disposed of. Workshop overhead and fleet-level cover are excluded because they continue regardless.	Equipment P&L
Annual depreciation charge	Historical charge for the unit, used only in the tax computation.	Equipment P&L
Net book value	Written-down value carried at 30 June 2026.	Fixed-asset register
Estimated market resale value	Price the unit is expected to realise if sold in its current condition.	Management estimate
Market rental rate	Price of hiring an equivalent machine of the same capacity class, inclusive of mobilisation.	Supplier quotations

Source: author.

3.4 The Incremental Cash-Flow Model

The decision is evaluated as an incremental cash-flow comparison over a two-year horizon. Only cash flows that differ between the two courses of action are counted (Fabozzi & Peterson, 2003). In the retain branch the company keeps the machine, incurs insurance and avoidable repair, claims whatever depreciation deduction remains, and recovers the after-tax market value at the end of year two. In the sell branch it disposes of the machine today, receives proceeds net of transaction cost and tax on the gain, and pays the market rental rate for every week it would have used the machine. Figure 3.1 sets out the two branches.

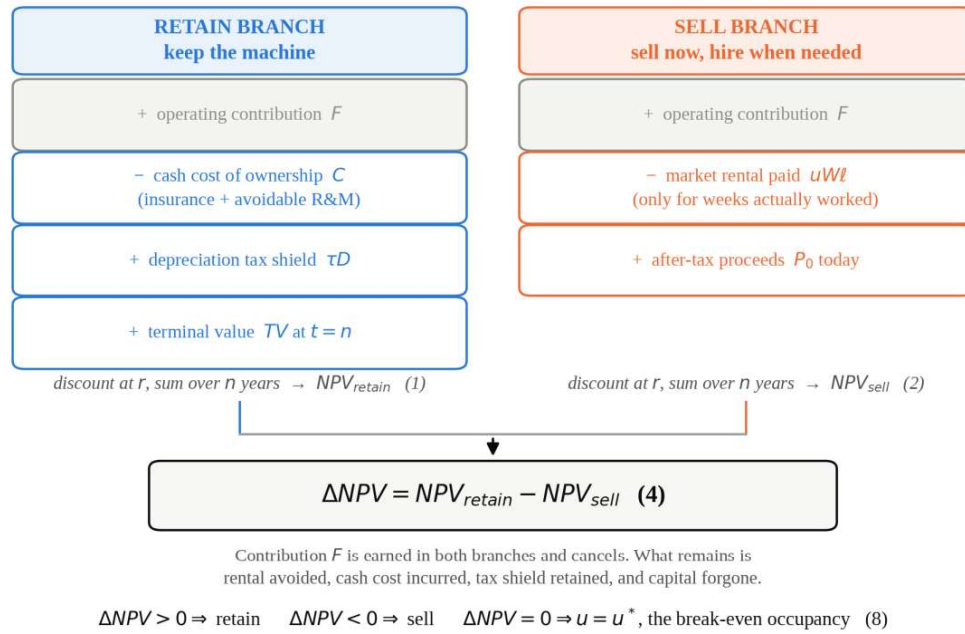


Figure 3.1 Structure of the incremental cash-flow comparison

Each branch is valued over the same horizon and discounted at the same rate; the decision is the sign of the difference. Source: author.

The two branches are valued as:

$$NPV_{retain} = A[(F - C)(1 - \tau) + \tau D] + TV(1 + r)^{-n} \quad (1)$$

$$NPV_{sell} = P_0 + A(F - uW\ell)(1 - \tau) \quad (2)$$

where A is the annuity factor that discounts one unit of cash received at the end of each year of the horizon:

$$A = (1 + r)^{-1} + (1 + r)^{-2} \quad (3)$$

Taking the difference gives the incremental value of retention:

$$\Delta NPV = A(1 - \tau)(uW\ell - C) + A\tau D + TV(1 + r)^{-n} - P_0 \quad (4)$$

Operating contribution F cancels exactly. The company earns the same revenue on a project whether the machine is owned or hired, so contribution appears identically in both branches and cannot influence the choice. What remains in equation (4) is a comparison of four quantities: the rental avoided by owning, the cash cost incurred by owning, the depreciation shield retained by owning, and the capital forgone by not selling.

3.5 Notation

Table 3.2 defines every symbol used in equations (1) to (8), states where its value comes from, and evaluates it for one unit, the 85-tonne crawler crane I45-310013, under the pessimistic scenario. That unit is carried through the worked example in Section 3.9.

Table 3.2 Notation used in the model

Symbol	Meaning	Where the value comes from	I45-310013
u	Occupancy: billable weeks as a share of weeks available. The variable the decision turns on.	Forecast by capacity class (Table 4.6)	27% (pessimistic)
W	Weeks available in a year, the denominator of the occupancy measure.	Assumption	52 weeks
ℓ	Market rental rate per week for the unit's capacity class.	Supplier quotation (Table 4.5)	IDR 64.7 m
$uW\ell$	Annual rental the company avoids by owning the machine rather than hiring it.	Computed	IDR 907.9 m
F	Annual operating contribution earned by the unit. Appears in both branches and cancels.	Equipment P&L (Table 4.4)	IDR 255.1 m (cancels)
C	Annual cash cost of ownership: insurance plus avoidable repair and maintenance.	Equipment P&L (Table 4.4)	IDR 166.1 m
D_{hist}	Historical annual depreciation charge for the unit.	Equipment P&L	IDR 681.5 m
D	Annual depreciation deduction actually available, capped at remaining book value spread over the horizon.	Equation (7)	IDR 400.0 m
BV_0	Net book value today.	Fixed-asset register (Table 4.1)	IDR 800.0 m
BV_n	Net book value at the end of the horizon, after the deductions claimed.	Equation (7)	IDR 0.0 m
M	Estimated market value of the unit today.	Management estimate (Table 4.1)	IDR 1,800.0 m
k	Transaction cost on sale, as a share of market value: broker, transport, and transfer.	Assumption (Table 3.4)	5%
δ	Rate at which market value declines per year.	Assumption (Table 3.4)	12%
P_0	After-tax disposal proceeds received today.	Equation (5)	IDR 1,490.0 m
TV	After-tax terminal value at the end of the horizon, if the unit is retained and then sold.	Equation (6)	IDR 1,087.3 m (IDR 923.6 m discounted)

Symbol	Meaning	Where the value comes from	I45-310013
τ	Corporate income tax rate.	Law No. 7/2021 (Republic of Indonesia, 2021)	22%
r	After-tax discount rate, the opportunity cost of the capital tied up in the machine.	Assumption (Table 3.4)	8.5%
n	Analysis horizon in years.	Assumption (Table 3.4)	2 years
A	Annuity factor over the horizon.	Equation (3)	1.7711
ΔNPV	Incremental value of retention: NPV of retaining less NPV of selling. Positive means retain.	Equation (4)	+IDR 614.3 m
u^*	Break-even occupancy: the occupancy at which ΔNPV is zero.	Equation (8)	13.8%

Source: author. Monetary values in IDR million. The example column evaluates every symbol for a single unit under the pessimistic scenario.

3.6 Proceeds, Terminal Value, and the Depreciation Deduction

Three of the symbols in Table 3.2 are themselves computed rather than observed, and each carries a tax effect that has to be handled consistently.

Disposal proceeds are the market value less the cost of transacting, less tax on the gain over book value:

$$P_0 = M(1 - k) - (M - BV_0)\tau \quad (5)$$

Terminal value is the same calculation performed at the end of the horizon, on a market value that has declined at δ per year and against whatever book value then remains:

$$TV = M(1 - \delta)^n - [M(1 - \delta)^n - BV_n]\tau \quad (6)$$

Depreciation is not a cash cost and is not charged as one. It enters the model only through the tax computation, where it reduces taxable income in the retain branch, which is the term $A\tau D$ in equation (4). One restriction applies and materially affects the results: a unit can deduct only up to the net book value it still carries. The annual deduction and the closing book value are therefore:

$$D = \min(D_{hist}, BV_0/n) \quad \text{and} \quad BV_n = \max(0, BV_0 - nD) \quad (7)$$

The cap is required for consistency with equation (6), which writes book value down by the same deductions and then taxes the gain on disposal. Applying the historical charge without the cap would claim a shield the company cannot

claim while understating the taxable gain at the horizon, counting the benefit of depreciation twice. In this fleet eleven units are fully written down and claim nothing, six carry book value smaller than two years of the historical charge and are capped at the remaining balance, and four claim the full charge in both years. Because the shield is concentrated in the newer units and absent from the older ones, while the older units carry the highest realisable value, this treatment is one of the two forces driving the disposal signals reported in Chapter 4.

3.7 Treatment of Financing

The analysis covers equipment the company already owns, irrespective of whether a unit was purchased outright or acquired through bank instalments. Financing cash flows are excluded from both branches, for two reasons.

First, the obligation is identical either way. If a unit is retained, instalments continue; if it is sold, the outstanding balance is settled from the proceeds. The same amount is owed to the bank in both branches, so it cancels from the difference. What equation (4) values is the asset decision, not the funding decision, and the cost of funding is carried in the discount rate r .

Second, charging both depreciation and instalments as costs would count the same machine twice. Depreciation is the accounting spread of the purchase price; the instalment is the cash repayment of the money borrowed to pay it. The model charges neither as a cash cost: depreciation enters only through tax, and instalments not at all.

The recommendation is therefore independent of how each unit was acquired. Two practical consequences are recorded in Section 5.3: proceeds are stated before settlement of any outstanding balance, and the interest tax shield forgone on early settlement is not modelled.

3.8 Break-even Occupancy

Setting ΔNPV in equation (4) to zero and solving for u gives the break-even occupancy:

$$u^* = [P_0 - TV(1 + r)^{-n} + A(C(1 - \tau) - \tau D)] / [A W \ell (1 - \tau)] \quad (8)$$

Because ΔNPV is linear in occupancy, the threshold is solved directly rather than by iteration. The numerator is the net capital cost of holding the machine: the proceeds forgone today, less the value recovered at the horizon, plus the cash cost of ownership net of the tax shield. The denominator is the present value of one full year of rental avoided, after tax, over the horizon; one percentage point of occupancy is therefore worth one-hundredth of it. Neither depends on how busy the machine is expected to be, so u^* is a stable property of each unit: computed once, and compared against occupancy under any scenario. The denominator differs by capacity class because the rental rate differs, which is why the thresholds reported in Chapter 4 are lowest for the classes that are most expensive to hire relative to their capital value.

3.9 Worked Example

Table 3.3 evaluates the model for unit I45-310013 under the pessimistic scenario, carrying the values from the last column of Table 3.2 through each equation in turn.

Table 3.3 Worked example: unit I45-310013, pessimistic scenario

Step	Equation	Substitution	Result
Annuity factor	(3)	$A = 1/1.085 + 1/1.085^2 = 0.9217 + 0.8495$	1.7711
Depreciation deduction	(7)	$D = \min(681.5, 800.0/2)$; $BV_2 = \max(0, 800.0 - 2 \times 400.0)$	$D = 400.0$ $BV_2 = 0.0$
Disposal proceeds	(5)	$P_0 = 1,800.0 \times (1 - 0.05) - (1,800.0 - 800.0) \times 0.22$	1,490.0
Terminal value	(6)	$M(1 - \delta)^2 = 1,800.0 \times 0.88^2 = 1,393.9$; $TV = 1,393.9 - (1,393.9 - 0.0) \times 0.22$	1,087.3 923.6 discounted
Rental avoided per year	—	$uWt = 0.27 \times 52 \times 64.7$	907.9
Incremental value	(4)	$\Delta NPV = 1.7711 \times 0.78 \times (907.9 - 166.1) + 1.7711 \times 0.22 \times 400.0 + 923.6 - 1,490.0$	+614.3 Retain
Break-even occupancy	(8)	$u^* = [1,490.0 - 923.6 + 1.7711 \times (166.1 \times 0.78 - 0.22 \times 400.0)] \div [1.7711 \times 52 \times 64.7 \times 0.78]$	13.8%

Source: author. Monetary values in IDR million. Figures are rounded for presentation; the model carries full precision.

The unit is worth IDR 614.3 million more retained than sold, and would remain so down to an occupancy of 13.8 per cent. The pessimistic scenario assigns its class 27 per cent, so the forecast clears the threshold by 13.2

percentage points. The same calculation is performed for all twenty-one units in Chapter 4.

3.10 Occupancy Forecast

The forecast is prepared at capacity-class level rather than per unit, since projecting each of twenty-one units individually would not be reliable, whereas a class-level projection reflects how that class is expected to be absorbed by future work. Identified opportunities are listed by class, weighted by an assessed probability of award, aggregated by month, and expressed as a proportion of the fifty-two weeks available per year.

Two scenarios are carried forward. The pessimistic scenario assumes the award drought observed in 2025 persists through both forecast years. The realistic scenario applies the probability weighting to the pipeline as it currently stands. An optimistic scenario was prepared but is not reported; Section 4.10 sets out why a more favourable forecast cannot change any decision.

3.11 Decision Rule

The decision rule is applied per unit in three steps. First, the sign of ΔNPV : positive indicates retention, negative indicates disposal. Second, the margin of safety, calculated as forecast occupancy less break-even occupancy in percentage points, which shows how far the forecast would have to be wrong before the decision reverses. Third, the operational constraints: a retention floor set at the peak concurrent deployment observed over 2022 to 2026, below which the business could not serve a repeat of its own historical peak without hiring in at spot rates, and a strategic-reserve check on capacity for which no substitute exists within the fleet. A disposal indicated by the model is overridden where it would breach either constraint.

3.12 Sensitivity Testing

Four model inputs are estimates rather than direct observations: market value (M), market rental rate (ℓ), discount rate (r), and transaction cost (k). Each input is varied across a plausible range while the other three are held at their base

values, and the model is recalculated for all twenty-one units following Fabozzi and Peterson (2003).

Two outcomes are recorded for each variation: the change in fleet NPV (Δ NPV), which shows how strongly each input affects the overall financial result, and the number of units whose recommended decision changes. The second measure is particularly important because it directly affects the recommendation, even when the change in total fleet NPV is relatively small.

A recommendation that remains unchanged across the full tested range is considered robust. If the recommended decision changes, the relevant range of input values is reported to show where the recommendation remains valid. However, because the analysis varies one input at a time, it does not capture situations where several inputs change simultaneously. The direction of this potential bias is discussed in Section 5.3.

3.13 Model Assumptions

Table 3.4 states the parameters applied uniformly across all units.

Table 3.4 Model assumptions

Parameter	Symbol	Value	Basis
Analysis horizon	n	2 years	Matches the forecast horizon
Corporate income tax rate	τ	22%	Law No. 7/2021 (Republic of Indonesia, 2021)
Discount rate, after tax	r	8.5%	Opportunity cost of capital; tested in Section 4.8
Transaction cost on sale	k	5%	Broker, transport, and transfer; tested in Section 4.8
Market value decline	δ	12% per year	Assumption; tested in Section 4.8
Weeks available per year	W	52 weeks	Denominator of the occupancy measure
Retention floor, crawler cranes	—	5 units	Peak concurrent deployment, 2022 to 2026
Retention floor, excavators	—	5 units	Peak concurrent deployment, 2022 to 2026

Source: author.

CHAPTER 4

RESULTS AND ANALYSIS

This chapter applies the model specified in Chapter 3 to the twenty-one units in scope. Sections 4.1 to 4.4 set out the inputs; Section 4.5 reports the break-even occupancy of every unit, which is common to both scenarios; Sections 4.6 and 4.7 apply the pessimistic and the realistic forecast; Sections 4.8 to 4.11 test and interpret the result. All monetary figures are in millions of rupiah. A positive Δ NPV means retention is worth more than disposal.

4.1 Fleet Profile

The fleet comprises nine crawler cranes of 55 to 85 tonnes and twelve 20-tonne excavators, with an estimated market value of IDR 31,010 million: IDR 20,500 million in the cranes and IDR 10,510 million in the excavators. Aggregate net book value is IDR 7,150 million. The gap between the two is the first substantive finding: 11 of the twenty-one units are fully written down, generating no further depreciation deduction while retaining realisable market value.

Table 4.1 Fleet composition at 30 June 2026

No	Unit ID	Category	Cap. (t)	Year	Age (yr)	Book value	Market price
1	I45-310013	Crawler crane	85	2022	4	800	1,800
2	I45-310010	Crawler crane	80	2018	8	0	2,500
3	I45-310015	Crawler crane	60	2023	3	1,421	2,300
4	I45-310014	Crawler crane	60	2023	3	1,329	2,300
5	I45-310012	Crawler crane	60	2022	4	653	2,200
6	I45-310011	Crawler crane	60	2022	4	560	2,200
7	I45-310009	Crawler crane	55	2019	7	0	2,400
8	I45-310008	Crawler crane	55	2019	7	0	2,400
9	I45-310007	Crawler crane	55	2018	8	0	2,400
10	I45-420006	Excavator	20	2018	8	0	850
11	I45-420007	Excavator	20	2018	8	0	850
12	I45-420008	Excavator	20	2018	8	0	850
13	I45-420009	Excavator	20	2021	5	0	865
14	I45-420010	Excavator	20	2021	5	0	865
15	I45-420011	Excavator	20	2021	5	0	865
16	I45-420012	Excavator	20	2021	5	0	865

No	Unit ID	Category	Cap. (t)	Year	Age (yr)	Book value	Market price
17	I45-420013	Excavator	20	2022	4	248	875
18	I45-420014	Excavator	20	2022	4	248	875
19	I45-420015	Excavator	20	2023	3	491	900
20	I45-420016	Excavator	20	2023	3	590	900
21	I45-420017	Excavator	20	2024	2	810	950

Source: company fixed-asset register and management estimates of resale value. Values in IDR million.

4.2 Historical Occupancy, 2022 to June 2026

Occupancy is measured as billable weeks: weeks in which a unit was on hire and generating revenue. Weeks spent idle, under repair, or mobilised but not yet billing are excluded. The measure is taken from the monthly deployment records and is the same measure used in the forecast.

Table 4.2 Fleet occupancy by year

Year	Units in service	Billable weeks	Weeks available	Occupancy
2022	16	597	832	71.8%
2023	20	790	1,040	76.0%
2024	21	803	1,092	73.5%
2025	21	389	1,092	35.6%
2026 (Jan–Jun)	21	275	630	43.7%

Source: monthly deployment records. 2026 covers January to June, with thirty weeks available per unit.

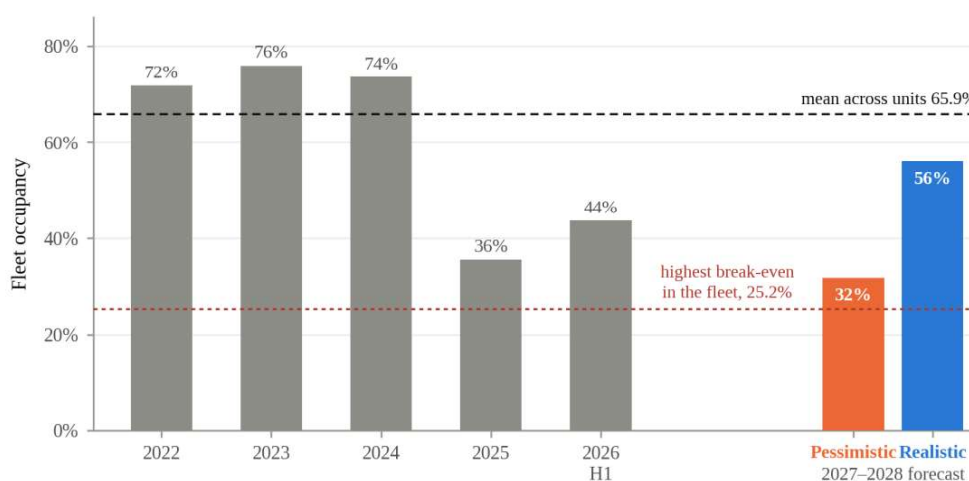


Figure 4.1 Fleet occupancy, 2022 to June 2026, and the 2027–2028 forecast

Source: monthly deployment records and project pipeline.

Occupancy held between 72 and 76 per cent through 2022 to 2024, collapsed to 36 per cent in 2025, and recovered to 44 per cent in the first half of 2026. The 2025 trough reflects the pause in downstream and infrastructure awards following the change of national administration. The pessimistic scenario is calibrated against that year and should be read as the question of what happens if 2025 repeats twice more.

Table 4.3 Billable weeks by unit, 2022 to June 2026

No	Unit ID	2022	2023	2024	2025	2026 H1	Total	Avail.	Avg. occ.
1	I45-310013	11	26	27	16	26	106	196	54.1%
2	I45-310010	51	35	52	12	0	150	234	64.1%
3	I45-310015	0	0	30	13	10	53	117	45.3%
4	I45-310014	0	0	42	14	26	82	124	66.1%
5	I45-310012	0	34	52	32	24	142	188	75.5%
6	I45-310011	11	50	21	39	4	125	196	63.8%
7	I45-310009	51	48	39	0	13	151	234	64.5%
8	I45-310008	51	50	42	52	26	221	234	94.4%
9	I45-310007	52	52	39	25	26	194	234	82.9%
10	I45-420006	51	52	38	0	0	141	234	60.3%
11	I45-420007	52	52	47	33	0	184	234	78.6%
12	I45-420008	41	49	34	18	0	142	234	60.7%
13	I45-420009	46	52	41	3	26	168	234	71.8%
14	I45-420010	45	48	39	33	0	165	234	70.5%
15	I45-420011	52	50	38	3	26	169	234	72.2%
16	I45-420012	47	51	44	11	24	177	234	75.6%
17	I45-420013	18	47	32	2	10	109	200	54.5%
18	I45-420014	18	42	43	28	6	137	200	68.5%
19	I45-420015	0	35	39	27	26	127	169	75.1%
20	I45-420016	0	17	52	11	0	80	158	50.6%
21	I45-420017	0	0	12	17	2	31	92	33.7%

Source: monthly deployment records. Weeks available reflect the date each unit entered service.

Fleet occupancy averaged 65.9% across the period, with cranes at 67.9% and excavators at 64.4%. Peak concurrent deployment was five crawler cranes and five excavators; that figure sets the retention floor applied in Section 4.9.

4.3 Cost Structure and Rental Benchmarks

Three figures are needed per unit: operating contribution per billable week, the annual cash cost of ownership, and the annual depreciation charge. Contribution is annual revenue divided by annual billable weeks. Direct operating costs such as fuel and operator wages are charged to the project and are incurred whether the machine is owned or rented, so they appear identically in both branches and are excluded.

The cash cost of ownership is insurance plus avoidable repair and maintenance. Only costs that cease on disposal are counted; fleet-level insurance and workshop overhead continue regardless and are not treated as savings. This understates the saving from selling and therefore biases the model towards retention, which makes any disposal signal harder to obtain and more credible when it appears.

Table 4.4 Revenue, avoidable cost, and depreciation per unit, annual average

No	Unit ID	Revenue	Insurance	R&M	Deprec.	Billable wks	Contrib./wk
1	I45-310013	511	16.4	149.6	681	28.1	18.2
2	I45-310010	902	30.7	27.1	496	33.3	27.1
3	I45-310015	113	13.2	2.5	495	23.5	4.8
4	I45-310014	617	11.5	1.4	532	34.4	18.0
5	I45-310012	503	12.0	130.3	456	39.2	12.8
6	I45-310011	506	13.4	100.3	477	33.1	15.3
7	I45-310009	641	25.4	29.6	662	33.5	19.1
8	I45-310008	838	19.7	83.2	621	49.1	17.1
9	I45-310007	1,079	22.4	45.9	334	43.1	25.1
10	I45-420006	272	6.0	13.0	65	31.3	8.7
11	I45-420007	227	6.0	13.9	65	40.9	5.6
12	I45-420008	210	7.3	9.7	109	31.5	6.7
13	I45-420009	180	5.9	44.1	218	37.3	4.8
14	I45-420010	235	5.9	41.5	222	36.6	6.4
15	I45-420011	213	7.3	39.8	227	37.5	5.7
16	I45-420012	308	7.6	45.3	245	39.3	7.8
17	I45-420013	100	6.3	48.0	235	28.3	3.5
18	I45-420014	132	6.3	42.4	235	35.6	3.7
19	I45-420015	237	7.1	45.2	288	39.0	6.1
20	I45-420016	120	6.8	58.7	276	26.3	4.6

No	Unit ID	Revenue	Insurance	R&M	Deprec.	Billable wks	Contrib./wk
21	I45-420017	82	5.0	5.3	198	17.5	4.7

Source: equipment profit-and-loss statement. Values in IDR million except billable weeks.

The rental benchmarks in Table 4.5 are the price of hiring an equivalent machine on the open market. They are supplier quotations inclusive of mobilisation; the weekly rate is the monthly rate divided by 4.33. These rates drive the model, because every week a retained machine works is a week of rental avoided, and avoided rental is the return to ownership.

Table 4.5 Market rental rates by capacity class

Capacity class	Rate per month	Rate per week	Quotation source
CC-80 – 85t	280.0	64.7	PT ICP, 29 Aug 2026
CC-55 – 60t	165.0	38.1	PT CHS, 1 Sep 2026
EX-20t	88.3	20.4	PT ICP, 11 Sep 2026

Source: supplier quotations. Values in IDR million, inclusive of mobilisation.

4.4 Forecast Occupancy

Forecast occupancy for 2027 and 2028 was built from the project pipeline by the procedure set out in Section 3.10.

Table 4.6 Forecast occupancy by capacity class

Capacity class	Units	Pessimistic	Realistic	Actual 2022–Jun 26
CC-80 – 85t	2	27%	49%	59.1%
CC-55 – 60t	7	28%	60%	70.4%
EX-20t	12	35%	55%	64.4%
Fleet average, across units	21	30%	55%	65.9%

Source: project pipeline 2027–2028 weighted by probability of award, and Table 4.3. Actual occupancy is the unweighted mean across units in the class.

Both scenarios sit below what the fleet achieved over 2022 to June 2026. The realistic scenario represents a return to normal trading rather than a recovery beyond it; the pessimistic scenario represents the 2025 drought persisting for two more years.

4.5 Break-even Occupancy by Unit

Break-even occupancy is computed from equation (8) and does not depend on the demand scenario. It is reported here once and used in both Sections 4.6 and 4.7.

Table 4.7 Break-even occupancy by unit

No	Unit ID	Class	Book value	Market price	Deprec. deduction D	Cash cost C	Break-even u*
1	I45-310013	CC-80 – 85t	800	1,800	400	166.1	13.8%
2	I45-310010	CC-80 – 85t	0	2,500	0	57.8	13.4%
3	I45-310015	CC-55 – 60t	1,421	2,300	495	15.7	20.4%
4	I45-310014	CC-55 – 60t	1,329	2,300	532	12.9	20.2%
5	I45-310012	CC-55 – 60t	653	2,200	327	142.3	25.2%
6	I45-310011	CC-55 – 60t	560	2,200	280	113.7	23.7%
7	I45-310009	CC-55 – 60t	0	2,400	0	55.0	21.8%
8	I45-310008	CC-55 – 60t	0	2,400	0	102.9	24.2%
9	I45-310007	CC-55 – 60t	0	2,400	0	68.3	22.5%
10	I45-420006	EX-20t	0	850	0	19.0	14.4%
11	I45-420007	EX-20t	0	850	0	19.9	14.5%
12	I45-420008	EX-20t	0	850	0	16.9	14.2%
13	I45-420009	EX-20t	0	865	0	50.0	17.5%
14	I45-420010	EX-20t	0	865	0	47.4	17.3%
15	I45-420011	EX-20t	0	865	0	47.1	17.3%
16	I45-420012	EX-20t	0	865	0	52.9	17.8%
17	I45-420013	EX-20t	248	875	124	54.3	18.5%
18	I45-420014	EX-20t	248	875	124	48.7	18.0%
19	I45-420015	EX-20t	491	900	246	52.4	19.1%
20	I45-420016	EX-20t	590	900	276	65.5	20.5%
21	I45-420017	EX-20t	810	950	198	10.3	16.7%

Source: author's calculation from equations (7) and (8). Values in IDR million.

Thresholds range from 13.4% to 25.2%, and group by capacity class rather than by age or condition. The two large cranes break even at 13.8 and 13.4 per cent; the twelve excavators between 14.2 and 20.5 per cent; the seven mid-size cranes between 20.2 and 25.2 per cent. The fleet mean is 18.6%, against historical occupancy of 65.9%.

The ordering follows the ratio of rental rate to capital value. A 20-tonne excavator commands IDR 20.4 million a week against a market value of IDR 850 to 950 million; a 55-tonne crane commands IDR 38.1 million against IDR 2,200 to 2,400 million. The excavators are cheap to own relative to what they cost to hire; the mid-size cranes are not. Age and book value shift a unit within its class, through the depreciation shield and the taxable gain on disposal, but they do not reorder the classes.

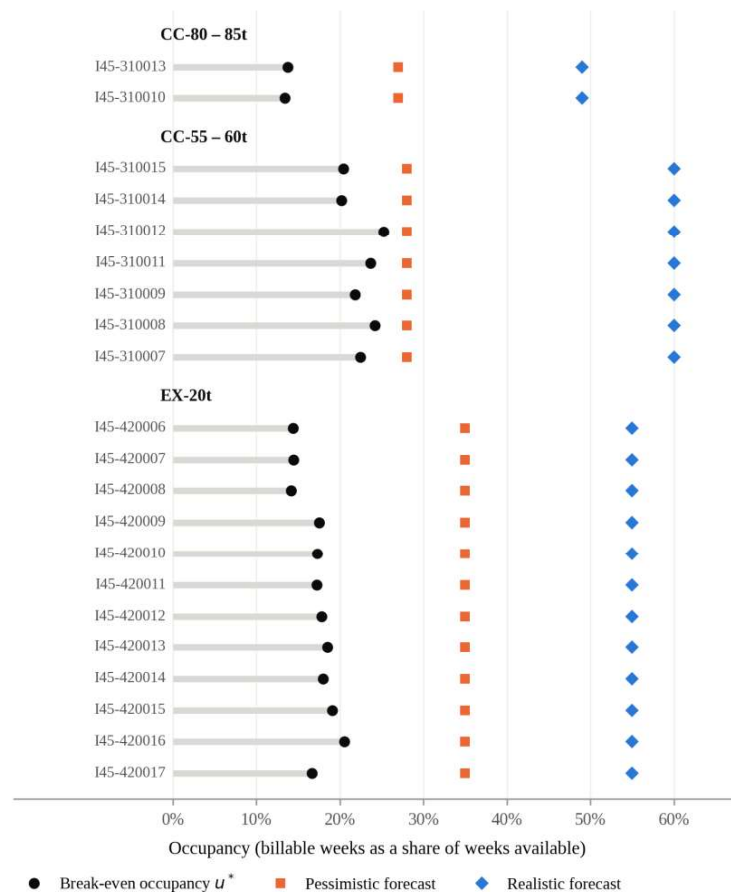


Figure 4.2 Break-even occupancy against forecast occupancy, by unit

A unit would be a disposal candidate where the forecast occupancy of its class falls below its own threshold. No unit does so: every threshold marker sits to the left of its class forecast. Source: author's calculation.

4.6 Pessimistic Scenario

Under the pessimistic scenario large cranes work 27 per cent of the year, mid-size cranes 28 per cent, and excavators 35 per cent. Table 4.8 reports the components of the comparison for every unit.

Table 4.8 Incremental cash-flow model by unit, pessimistic scenario

No	Unit ID	Cash flow retains	Terminal value	NPV retain	Proceeds P ₀	Rental per yr	NPV sell	ΔNPV
1	I45-310013	157	1,087	1,202	1,490	908	588	+614
2	I45-310010	251	1,510	1,728	1,825	908	1,096	+632
3	I45-310015	151	1,484	1,528	1,992	555	1,321	+207
4	I45-310014	311	1,448	1,780	1,971	555	1,566	+214
5	I45-310012	107	1,329	1,317	1,750	555	1,241	+76
6	I45-310011	146	1,329	1,388	1,729	555	1,270	+118
7	I45-310009	174	1,450	1,540	1,752	555	1,370	+170
8	I45-310008	114	1,450	1,433	1,752	555	1,329	+104
9	I45-310007	231	1,450	1,641	1,752	555	1,490	+152
10	I45-420006	109	513	628	620	371	326	+302
11	I45-420007	63	513	548	620	371	247	+301
12	I45-420008	81	513	580	620	371	276	+305
13	I45-420009	29	522	496	631	371	240	+256
14	I45-420010	54	522	539	631	371	280	+259
15	I45-420011	44	522	522	631	371	262	+260
16	I45-420012	70	522	568	631	371	316	+252
17	I45-420013	35	529	511	693	371	270	+242
18	I45-420014	42	529	523	693	371	274	+249
19	I45-420015	99	544	638	765	371	405	+233
20	I45-420016	75	552	601	787	371	389	+212
21	I45-420017	102	665	745	872	371	477	+269

Source: author's calculation. Values in IDR million.

Fleet ΔNPV is IDR 5,425 million in favour of retention, and every one of the twenty-one units is positive. Cranes contribute IDR 2,287 million and excavators IDR 3,138 million; within the cranes, the two large units contribute IDR 1,246 million and the seven mid-size units IDR 1,041 million. The excavators dominate despite representing only IDR 10,510 million of fleet value, for the reason given in Section 4.5.

Table 4.9 Retain-or-sell decision by unit, pessimistic scenario

No	Unit ID	Class	Actual occ.	Forecast	Break-even	Margin (pp)	ΔNPV	Decision
1	I45-310013	CC-80 – 85t	54.1%	27%	13.8%	+13.2	+614	Retain
2	I45-310010	CC-80 – 85t	64.1%	27%	13.4%	+13.6	+632	Retain
3	I45-310015	CC-55 – 60t	45.3%	28%	20.4%	+7.6	+207	Retain
4	I45-310014	CC-55 – 60t	66.1%	28%	20.2%	+7.8	+214	Retain
5	I45-310012	CC-55 – 60t	75.5%	28%	25.2%	+2.8	+76	Retain
6	I45-310011	CC-55 – 60t	63.8%	28%	23.7%	+4.3	+118	Retain
7	I45-310009	CC-55 – 60t	64.5%	28%	21.8%	+6.2	+170	Retain
8	I45-310008	CC-55 – 60t	94.4%	28%	24.2%	+3.8	+104	Retain
9	I45-310007	CC-55 – 60t	82.9%	28%	22.5%	+5.5	+152	Retain
10	I45-420006	EX-20t	60.3%	35%	14.4%	+20.6	+302	Retain
11	I45-420007	EX-20t	78.6%	35%	14.5%	+20.5	+301	Retain
12	I45-420008	EX-20t	60.7%	35%	14.2%	+20.8	+305	Retain
13	I45-420009	EX-20t	71.8%	35%	17.5%	+17.5	+256	Retain
14	I45-420010	EX-20t	70.5%	35%	17.3%	+17.7	+259	Retain
15	I45-420011	EX-20t	72.2%	35%	17.3%	+17.7	+260	Retain
16	I45-420012	EX-20t	75.6%	35%	17.8%	+17.2	+252	Retain
17	I45-420013	EX-20t	54.5%	35%	18.5%	+16.5	+242	Retain
18	I45-420014	EX-20t	68.5%	35%	18.0%	+17.0	+249	Retain
19	I45-420015	EX-20t	75.1%	35%	19.1%	+15.9	+233	Retain
20	I45-420016	EX-20t	50.6%	35%	20.5%	+14.5	+212	Retain
21	I45-420017	EX-20t	33.7%	35%	16.7%	+18.3	+269	Retain

Source: author's calculation. Margin is forecast occupancy less break-even occupancy, in percentage points. Values in IDR million.

The seven mid-size cranes clear their 28 per cent forecast by between 2.8 and 7.8 percentage points, the narrowest margins in the fleet. Every excavator clears its own threshold by at least 14.5 points, and both large cranes by at least 13.2 points.

4.6.1 The narrowest margins

Table 4.10 Characteristics of the units with the narrowest margins

Unit ID	Year	Age	Book value	Market price	Break-even	Actual occ.	ΔNPV
I45-310012	2022	4	653	2,200	25.2%	75.5%	+76
I45-310008	2019	7	0	2,400	24.2%	94.4%	+104
I45-310011	2022	4	560	2,200	23.7%	63.8%	+118

Source: author's calculation. Values in IDR million.

These three carry the narrowest margins in the fleet, but not for a single shared reason. I45-310012 and I45-310011 are 2022-vintage 60-tonne cranes still carrying book value and a depreciation shield; their narrow margin comes from an unusually high avoidable cash cost, the two highest in the mid-size class. I45-310008 is the 2019-vintage 55-tonne crane fully written down, with no depreciation shield and a resale value of IDR 2,400 million. What the three share is the mid-size class itself, which combines the lowest rental-to-capital ratio in the fleet (Section 4.5) with, for each unit, one further factor — cash cost or resale value — that narrows the margin further. Aggregate ΔNPV across the three is IDR 298 million, against a fleet total of IDR 5,425 million. Three qualifications attach to this finding.

The magnitudes are modest. The three narrowest units contribute IDR 298 million combined against a fleet ΔNPV of IDR 5,425 million, about 5.5 per cent of the value at stake, and none of it is at risk of disposal at the pessimistic forecast.

The margin does not track historical performance. I45-310012, I45-310011, and I45-310008 have historical occupancy of 75.5, 63.8, and 94.4 per cent; I45-310008 is the best-utilised crane in the whole fleet and still carries the second-narrowest margin. The result is coherent, because the model asks what the machine will do in 2027 and 2028 rather than what it did in 2023 — but it is also why the margin, not the historical record, is the number worth watching.

The margin is class-wide, not unit-specific. Table 4.11 shows how the hardest-to-clear unit in each class responds to the occupancy assumed for that class, holding the other two classes at their pessimistic values.

Table 4.11 Class occupancy required to clear every unit's threshold

Capacity class	Units	Pessimistic forecast	All retained from	First disposal below	Class Δ NPV
CC-80 – 85t	2	27%	14%	13%	1,246
CC-55 – 60t	7	28%	26%	25%	1,041
EX-20t	12	35%	21%	20%	3,138

Source: author's calculation. Values in IDR million.

The excavators would still clear their threshold at 21 per cent occupancy, 14 points below forecast, and the large cranes at 14 per cent, 13 points below. The mid-size cranes require 26 per cent, only 2 points below their 28 per cent forecast, the one class where the margin is measured in single points rather than tens.

4.7 Realistic Scenario

Under the realistic scenario large cranes work 49 per cent of the year, mid-size cranes 60 per cent, and excavators 55 per cent. Fleet Δ NPV is IDR 17,116 million against IDR 5,425 million under the pessimistic scenario. All twenty-one units are retained.

Table 4.12 Retain-or-sell decision by unit, realistic scenario

No	Unit ID	Class	Actual occ.	Forecast	Break-even	Margin (pp)	Δ NPV	Decision
1	I45-310013	CC-80 – 85t	54.1%	49%	13.8%	+35.2	+1,636	Retain
2	I45-310010	CC-80 – 85t	64.1%	49%	13.4%	+35.6	+1,654	Retain
3	I45-310015	CC-55 – 60t	45.3%	60%	20.4%	+39.6	+1,083	Retain
4	I45-310014	CC-55 – 60t	66.1%	60%	20.2%	+39.8	+1,090	Retain
5	I45-310012	CC-55 – 60t	75.5%	60%	25.2%	+34.8	+952	Retain
6	I45-310011	CC-55 – 60t	63.8%	60%	23.7%	+36.3	+994	Retain
7	I45-310009	CC-55 – 60t	64.5%	60%	21.8%	+38.2	+1,046	Retain
8	I45-310008	CC-55 – 60t	94.4%	60%	24.2%	+35.8	+980	Retain
9	I45-310007	CC-55 – 60t	82.9%	60%	22.5%	+37.5	+1,028	Retain
10	I45-420006	EX-20t	60.3%	55%	14.4%	+40.6	+595	Retain
11	I45-420007	EX-20t	78.6%	55%	14.5%	+40.5	+594	Retain

No	Unit ID	Class	Actual occ.	Forecast	Break-even	Margin (pp)	ΔNPV	Decision
12	I45-420008	EX-20t	60.7%	55%	14.2%	+40.8	+598	Retain
13	I45-420009	EX-20t	71.8%	55%	17.5%	+37.5	+549	Retain
14	I45-420010	EX-20t	70.5%	55%	17.3%	+37.7	+552	Retain
15	I45-420011	EX-20t	72.2%	55%	17.3%	+37.7	+553	Retain
16	I45-420012	EX-20t	75.6%	55%	17.8%	+37.2	+545	Retain
17	I45-420013	EX-20t	54.5%	55%	18.5%	+36.5	+534	Retain
18	I45-420014	EX-20t	68.5%	55%	18.0%	+37.0	+542	Retain
19	I45-420015	EX-20t	75.1%	55%	19.1%	+35.9	+526	Retain
20	I45-420016	EX-20t	50.6%	55%	20.5%	+34.5	+505	Retain
21	I45-420017	EX-20t	33.7%	55%	16.7%	+38.3	+561	Retain

Source: author's calculation. Break-even occupancy is unchanged from Table 4.7; it does not depend on the demand scenario. Values in IDR million.

The margins are wide. The narrowest is I45-420016 at 34.5 points and the smallest ΔNPV is I45-420016 at IDR 505 million. Under the pessimistic scenario the narrowest margin was 2.8 points; here the tightest case clears by more than 34.

The class pattern inverts. The seven mid-size cranes contributed IDR 1,041 million under the pessimistic scenario, the weakest class and the source of the narrowest margins; under the realistic scenario they contribute IDR 7,172 million, the largest of the three, ahead of the excavators at IDR 6,653 million and the large cranes at IDR 3,290 million. The reason is arithmetic: this class has the highest thresholds and is therefore the most geared to occupancy, losing most when utilisation is weak and gaining most when it returns. The mid-size cranes are not poor assets; they are the assets whose value depends most on the pipeline being filled.

4.8 Sensitivity Analysis

Each of the four estimated inputs identified in Section 3.12 was varied across its plausible range with the other three held at base, and the model recomputed for all twenty-one units.

Table 4.13 Sensitivity of the pessimistic-scenario result

Variable	Low	ΔNPV low	Disposals	High	ΔNPV high	Disposals	Swing
Estimated market price	85%	6,434	0	115%	4,416	0	2,018

Variable	Low	Δ NPV low	Disposals	High	Δ NPV high	Disposals	Swing
Market rental rate	90%	4,023	1	110%	6,828	0	2,805
Discount rate	6.5%	6,414	0	10.5%	4,487	0	1,927
Transaction cost on sale	3%	4,805	0	7%	6,046	0	1,240

Source: author's calculation. Base case: fleet Δ NPV IDR 5,425 million, all twenty-one units retained. Values in IDR million.

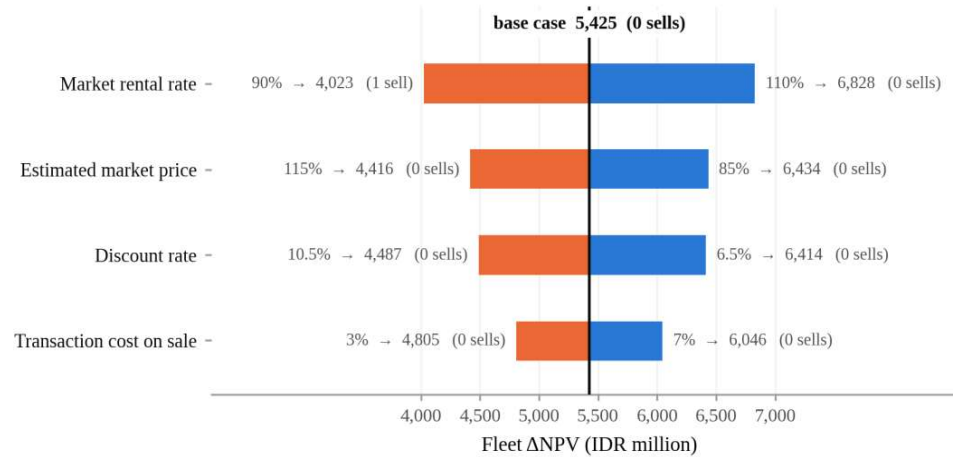


Figure 4.3 Sensitivity of the pessimistic-scenario fleet Δ NPV

Each bar spans the range produced by moving one input to either end of its plausible range, with the number of units indicated for disposal at each end. Source: author's calculation.

The rental rate is the most influential assumption, with a swing of IDR 2,805 million. Avoided rental is the return to ownership, so the rate at which it is avoided scales the whole retain case: ten per cent below quotation gives one disposal, ten per cent above gives none.

Resale value is second, and its direction still runs counter to intuition. A higher market price makes disposal more attractive, because price enters the sell branch as cash today through P_0 and the retain branch as terminal value two years out, reduced by two years of decline at δ and discounted at r . Under the current estimates, however, neither direction produces a disposal: raising the assumption by fifteen per cent leaves every unit positive, and lowering it does too. The disposal case that this test could once trigger no longer exists at either end of the plausible range.

The discount rate swings the result by IDR 1,927 million, a large effect over two years because terminal value is the single largest cash flow in the retain branch and sits entirely at the horizon. Transaction cost is least influential at IDR 1,240 million and affects only the sell branch.

Table 4.14 Sensitivity of the realistic-scenario result

Variable	Low	Δ NPV low	Disposals	High	Δ NPV high	Disposals	Swing
Estimated market price	85%	18,125	0	115%	16,107	0	2,018
Market rental rate	90%	14,544	0	110%	19,688	0	5,143
Discount rate	6.5%	18,432	0	10.5%	15,867	0	2,565
Transaction cost on sale	3%	16,496	0	7%	17,736	0	1,240

Source: author's calculation. Base case: fleet Δ NPV IDR 17,116 million, all twenty-one units retained. Values in IDR million.

The disposal column reads zero in all eight realistic-scenario cases. No assumption, moved to either end of its range, brings a single unit below threshold. Fleet Δ NPV moves between IDR 14,544 million and IDR 19,688 million but never approaches zero. The realistic recommendation does not depend on the accuracy of the resale estimates, the rental quotations, the discount rate, or the transaction cost. It depends only on the pipeline delivering roughly the occupancy the company has historically achieved.

The pessimistic result is now almost uniformly robust. No assumption moved within its range brings any of the twelve excavators, the two large cranes, or six of the seven mid-size cranes below threshold under either scenario. The exception is I45-310012, which turns marginally negative — about IDR 0.4 million — under the one test that lowers the rental rate by ten per cent; that is the only disposal recorded anywhere in Table 4.13. No other unit, and no other assumption, comes close.

4.9 Operational Constraints

The two constraints defined in Section 3.11 are applied before the model output becomes a recommendation. The retention floor stands at five units per category, and the strategic reserve is the pair of 80 to 85-tonne cranes, the only units in the fleet capable of the heaviest lifts tendered for.

Neither constraint binds under either scenario, and the question is now moot in the strongest sense: no unit is indicated for disposal under the pessimistic or the realistic forecast, so there is no count of retained units to test against the floor. The one sensitivity case that turns a unit negative (Table 4.13, rental rate ten per cent below quotation) affects a single mid-size crane; disposing of it alone would leave eight crawler cranes, well above the five-unit retention floor.

4.10 Scenario Comparison

Table 4.15 Comparison of scenario outcomes

Measure	Pessimistic	Realistic	Difference
Fleet occupancy assumed	32%	56%	+24 pp
Fleet Δ NPV (IDR m)	5,425	17,116	+11,691
Units retained	21	21	0
Units disposed of	0	0	0
Capital released (IDR m)	0	0	0
NPV cost of disposal (IDR m)	n/a	n/a	—
Narrowest margin (pp)	+2.8	+34.5	—
Disposals under sensitivity	0 to 1	0 in all cases	—
Retention floor binding	No	No	—

Source: author's calculation.

Retention is worth IDR 11,691 million more under the realistic scenario, a factor of 3.2. That gap measures what the pipeline is worth to the company in fleet terms. The value of the fleet decision is dominated by how much work the fleet gets, not by how many units are held — all twenty-one, under either scenario. Three structural observations hold regardless of which scenario proves correct.

The set of units at risk cannot grow as the forecast improves. Δ NPV is monotonically increasing in occupancy for every unit, so any unit retained under the pessimistic scenario is retained under any better one. Because all twenty-one units already clear their threshold under the pessimistic forecast — the most conservative of the three prepared — all twenty-one clear it under the realistic and optimistic forecasts as well, which is why the optimistic scenario, though prepared, is not reported in detail.

The highest threshold in the fleet is 25.2 per cent. Any scenario placing every class above that level retains the whole fleet, and the pessimistic scenario

already does: its lowest class-level clearance, in the mid-size cranes, is 28 against a 25.2 per cent requirement. The fleet sits inside a comfortable band under every scenario rather than straddling a narrow one.

The two scenarios now differ in degree of comfort rather than in kind. Both recommend retaining the whole fleet; the realistic recommendation is invariant to every assumption tested, while the pessimistic recommendation carries one narrow exception — a single unit, under a single adverse assumption, by an immaterial amount. The board is weighing two forecasts that agree on the decision and differ only in how much room each leaves for error.

4.11 Qualitative Assessment

Table 4.16 SWOT assessment of the fleet position

Strengths	Weaknesses
Eleven of twenty-one units are fully written down, so holding them carries no further accounting charge while disposal would crystallise a taxable gain. The excavator fleet clears its threshold by 14.5 to 20.8 points under the pessimistic scenario and is robust to every assumption tested. The two large cranes have the highest rental-to-capital ratio in the fleet and no substitute within it. The recommendation is independent of how each unit was financed.	Occupancy fell from 73.5 per cent in 2024 to 35.6 per cent in 2025 and has not recovered. The seven mid-size cranes carry the highest thresholds, 20.2 to 25.2 per cent, and represent IDR 16,200 million at the least favourable rental-to-value ratio. The narrowest margin in the fleet, I45-310012, comes from an unusually high avoidable cash cost rather than from age, resale value, or utilisation. The depreciation shield is exhausted on more than half the fleet.
Opportunities	Threats
Break-even occupancy is now established for every unit and can be recomputed whenever resale values or rental rates move, giving the company a ready early-warning metric. The pessimistic forecast already clears every threshold in the fleet, including the mid-size cranes, leaving headroom rather than a gap to close. Firm third-party valuations, recommended in Section 5.2.1, would convert the one input that still moves a unit under sensitivity testing into a market quotation. The model is unit-level and re-runnable as the pipeline is updated.	A repeat of the 2025 drought through 2027 and 2028 is the pessimistic scenario, and it has already occurred once. A rental market ten per cent cheaper than quoted would put one unit, I45-310012, marginally at risk; no other single-variable shock does. Resale values remain management judgements rather than market quotations, even though none is currently within reach of its threshold on that account. A hurdle rate materially above 8.5 per cent would still weaken the retain case across the fleet.

Source: author.

Where Table 4.16 describes the position of the fleet, Table 4.17 pairs those findings to derive strategy. Each entry states, in parentheses, the two assessment items it follows from. No entry proposes a disposal: the model retains all twenty-one units under both scenarios, so the strategic question is not which units to release but how a retained fleet should be priced, monitored, and defended.

Table 4.17 TOWS matrix: strategies derived from the SWOT assessment

	Internal strengths (S)	Internal weaknesses (W)
External opportunities (O)	SO Price tenders on avoidable cash cost, not on reported cost. The eleven fully written-down units incur only insurance and repair, so bidding on that basis restores competitiveness that the equipment P&L has been obscuring (S1, O2). Retain the two large cranes as a capability rather than as spare capacity. They break even at 13.4 and 13.8 per cent and have no substitute within the fleet, which makes them a prequalification asset for heavy-lift tenders (S3, O4). Adopt the excavator threshold band as an acquisition test. The twelve excavators clear by 14.5 to 20.8 points under every sensitivity case; their band of 14.2 to 20.5 per cent is a defensible hurdle for any future purchase (S2, O1).	WO Report each unit against its own threshold rather than a fleet-wide target. The 2025 decline became a loss narrative because no unit carried a trigger point of its own; a unit approaching its break-even would now surface months earlier (W1, O1). Obtain a firm rental quotation for the mid-size crane class. That class alone holds IDR 16,200 million at the least favourable rental-to-value ratio, and the rental rate is the only input that still moves a unit under testing (W2, O3). Address avoidable cash cost before reconsidering the asset. The narrowest margin, I45-310012, carries the highest cash cost in its class at IDR 142.3 million, followed by I45-310011 at IDR 113.7 million; reducing either widens the margin without a disposal (W3, O4).
External threats (T)	ST Exempt the two large cranes from any across-the-board fleet reduction. Should 2025 repeat, they still clear 13.4 to 13.8 per cent against a class forecast of 27 per cent, the widest margin in the fleet (S3, T1). Recompute the model at the company's own hurdle rate. The discount rate is the one assumption that can be specified rather than estimated, and it moves the fleet result by IDR 1,927 million; the excavators, holding the greatest headroom, form the floor	WT Place I45-310012 under formal monitoring with two named triggers. A firm quotation materially below the current estimate, or the next occupancy update for the mid-size pipeline; either justifies early recomputation, neither alone justifies acting now (W2, T2). Treat 26 per cent as the review trigger for the mid-size class. Every unit in the class is comfortably retained from that level, so a weakening pipeline prompts recomputation against a stated figure rather than

	Internal strengths (S)	Internal weaknesses (W)
	case (S2, T4). Commission third-party valuations for the mid-size class alone. Because the result is independent of how each unit was financed, resale uncertainty enters only through the capital forgone on sale, and only in that class is it large relative to the margin (S4, T3).	against sentiment (W1, T1). Bring market values onto an annual external valuation cycle. With the depreciation shield exhausted on more than half the fleet, those units' incremental value now rests largely on market and terminal value, both of which remain internal estimates (W4, T3).

Source: author, derived from Table 4.16.

4.12 Summary of Findings

Under the pessimistic scenario retention is worth IDR 5,425 million more than disposal, and all twenty-one units clear their threshold. The narrowest margins sit in the seven mid-size cranes, clearing by between 2.8 and 7.8 percentage points; every other unit clears by at least thirteen points. Sensitivity testing finds a single exception: I45-310012 turns marginally negative, by about IDR 0.4 million, if the rental market is ten per cent cheaper than quoted. No other unit and no other tested assumption produces a disposal.

Under the realistic scenario retention is worth IDR 17,116 million more than disposal, every unit clears its threshold by at least 34.5 percentage points, and no assumption tested produces a single disposal. Chapter 5 sets out what follows from a recommendation that now holds, with only one narrow exception, under both.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

5.1.1 Ownership is justified under both scenarios

Retention is worth IDR 5,425 million more than disposal under the pessimistic scenario and IDR 17,116 million more under the realistic one. The question posed in Chapter 1, whether the company holds more equipment than its demand justifies, is answered in the negative at fleet level under both, and the answer is now close to unqualified under either: all twenty-one units are retained under the realistic scenario, with no assumption tested changing that, and all twenty-one are retained under the pessimistic scenario too, with a single unit and a single adverse assumption standing between that result and complete robustness.

5.1.2 Break-even occupancy is far below historical utilisation

Thresholds range from 13.4 to 25.2 per cent, with a fleet mean of 18.6%, against historical occupancy of 65.9%. An owned machine has to work about one week in four, and in some cases one week in seven, before ownership beats renting. This is far below the intuition inside the business, which treated utilisation under roughly half as evidence that a machine was not paying for itself. That intuition is an accounting break-even, and Section 2.4 explains why it answers a different question. Because much of the fleet is written down and financing is common to both branches, the two measures diverge widely, and the accounting measure has been overstating the case for disposal throughout. This answers the first research question.

5.1.3 Exposure is concentrated in one capacity class

No unit is indicated for disposal under either scenario, but the fleet's exposure is not evenly spread. The seven mid-size cranes clear their threshold by single-digit percentage points under the pessimistic forecast, against thirteen points or more for every excavator and large crane; it is this class, holding IDR 16,200 million of capital at the least favourable rental-to-capital ratio in the fleet, that would be first to feel a forecast that undershoots even the pessimistic case.

That points to a class to watch rather than a mix to correct, and it answers the second and third research questions together: forecast occupancy clears the threshold everywhere, most comfortably outside that one class.

5.1.4 The two scenarios differ in robustness, not only in outcome

The pessimistic and realistic results now differ in robustness rather than in outcome. The realistic result has no sensitivity at all, with zero disposals in all eight tests; the pessimistic result has exactly one, a single mid-size crane, I45-310012, that turns marginally negative if the rental market prices ten per cent below quotation. That is a materially narrower exposure than a mix decision, and it leaves little for the board to resolve: the fleet-retention decision no longer turns on which demand scenario the company believes.

5.2 Recommendations

The model resolves what can be resolved by calculation. What follows is close to unconditional: retention is indicated whichever of the two scenarios the board believes, and the one item that still depends on judgement is a single unit under a single adverse condition. Table 5.1 sets out both.

Table 5.1 Recommendations for the board

Condition	Then the indicated action is	Consequence
Either scenario (pessimistic or realistic)	Retain all 21 units. No disposal indicated.	Fleet Δ NPV IDR 5,425 million to IDR 17,116 million in favour of retention. Every unit clears its own threshold in both scenarios.
The rental market weakens further (ten per cent below quotation, pessimistic occupancy)	Retain, but flag I45-310012 for a firm rental quotation before the next review.	The unit turns marginally negative, by about IDR 0.4 million. No other unit or assumption combination tested produces a disposal.
At the next pipeline review	Recompute break-even against updated occupancy and resale figures.	Break-even occupancy is a fixed property of each unit and does not need a full re-analysis to update — only the two inputs identified in Section 5.2.1.

Source: author.

There is, in the main, no longer a decision to defer. Retention is indicated under both scenarios, so the board does not need to resolve which forecast it believes before acting on Section 5.2.1. The one item that still depends on a

judgement call — whether to treat I45-310012 as at risk — is addressed directly in Section 5.2.1 rather than left to a scenario choice.

5.2.1 Recommendations that hold under either scenario

Management may consider retaining all 21 units under both the realistic and pessimistic scenarios, subject to the exception discussed below. The analysis indicates that 20 of the 21 units remain above their respective thresholds with sufficient margins, and these margins are not eliminated by any of the assumptions tested under either scenario.

Management may consider adopting break-even occupancy as a regular fleet performance metric. The threshold is specific to each machine and is independent of the demand scenario. It can also be recalculated when resale values or rental rates change. Evaluating each unit against its individual break-even occupancy, rather than against a single fleet-wide utilisation target, could provide management with greater visibility into potential concentration risks, particularly within the mid-size crane class.

Management may also consider replacing the assumed discount rate with the company's established hurdle rate in future analyses. The sensitivity analysis indicates that the discount rate can result in a difference of up to IDR 1,927 million under the pessimistic scenario. As the hurdle rate is a parameter that can be specified directly by the company, confirming and applying the company-specific rate would improve the alignment between the analysis and the company's investment decision-making framework.

Management may consider obtaining a firm rental quotation for the mid-size crane class, together with an independent third-party valuation of the relevant equipment. The sensitivity analysis indicates that a rental rate 10% below the current quotation is the tested condition that could cause I45-310012 to fall below its threshold. In contrast, changes in resale value within the tested range do not cause any unit to cross its respective threshold. Obtaining more reliable market-based inputs for rental rates and resale values would therefore provide additional evidence for management's final assessment.

5.3 Limitations

The time horizon used for the forecast is two years. Consequently, the terminal value accounts for a significant portion of the "retain" scenario's value, and the results are not extrapolated to a longer holding period.

The resale value represents a management estimate based on past sales experience rather than an official market quote. Based on current values, a five to fifteen percent error in either direction would not cause a single unit to cross the decision threshold in the pessimistic forecast; conversely, the single largest source of uncertainty is the rental rate, where a ten percent shortfall would cause a unit to cross that threshold.

Rental rates are assumed to remain constant throughout the two-year forecast period, and sensitivity analysis is conducted by varying one input at a time. In practice, rental rates fluctuate in line with the same demand cycles that affect occupancy levels; thus, they would be expected to decline in a scenario where occupancy also falls. Holding rental rates constant while reducing occupancy results in a lower valuation for the "retain" scenario than would otherwise be the case under pessimistic conditions this is the mechanism behind the single exception identified in Section 4.8. While the resulting bias is conservative, it remains significant; however, this thesis does not perform combined error testing (where key variables move in opposite directions).

Occupancy is measured in billable weeks rather than operating hours. Since the company records and bills in weeks, this metric aligns with revenue data; however, it does not distinguish between continuous heavy usage and intermittent standby status distinctions that would be reflected in residual value had machine-hour measurements been used.

Two consequences arise from the exclusion of financing aspects, as detailed in Section 3.7. Sales proceeds are stated prior to the settlement of any outstanding balances; if the balance exceeds the unit's market value, disposing of the asset would require a cash injection—a factor influencing the feasibility of execution rather than the economic comparison itself. This thesis does not model payment delays associated with the sell option. Furthermore, the loss of the

interest tax shield resulting from early settlement is not modeled; incorporating this factor would actually reinforce the decision to retain the asset, thereby leaving the established conclusion unchanged.

Each unit is treated independently; consequently, portfolio effects arising from owning multiple units within a single class such as one machine compensating for another's downtime are not modeled. The retention floor serves as a proxy for this aspect rather than a direct substitute.

5.4 Suggestions for Further Research

Modelling rental rates and occupancy as correlated rather than independent would remove the conservative bias identified above, and would show directly whether it explains the one exception recorded against I45-310012. Extending the horizon to five years with a replacement decision at the end would test whether the two-year result is an artefact of terminal-value weighting. A real-option treatment of the monitoring position in Table 5.1 would quantify, rather than describe qualitatively, the value of waiting for a firm rental quotation before treating that unit as at risk. Applying the framework across a larger sample of heavy equipment would establish whether these thresholds are typical of the sector. Modelling direct and indirect costs in greater detail, which could refine the analysis calculations.

5.5 Closing Remark

The question was whether Company ABC owns too much equipment. On this evidence it does not. All twenty-one units earn their keep even if the worst year in recent memory repeats twice more, and by a wider margin still if the pipeline delivers what it currently indicates. What exposure remains is narrow and specific one mid-size crane, and only if the rental market it competes against turns out to be materially cheaper than quoted rather than a mix the company needs to correct. What the analysis provides is not a verdict but a threshold: for each machine, the utilisation at which ownership stops paying. Measured against that threshold, the fleet is in noticeably better shape than the utilisation figures alone suggested.

REFERENCES

- Al Sugheyer, B., et al. (2009). *Leasing in development: Guidelines for emerging economies*. Washington, DC: International Finance Corporation.
- Annisa, S., Aulady, M. F. N., & Choiriyah, S. (2023). Analisis pengambilan keputusan pembelian atau penyewaan excavator pada proyek Frontage di Sidoarjo. *Jurnal Institut Teknologi Adhi Tama Surabaya*, 1(1), 53–64.
- Arizton. (2026). *Indonesia construction equipment market: Size, trends, growth & demand*. Chicago, IL: Arizton Advisory & Intelligence.
- Bolomope, M., Amidu, A. R., Ajayi, S., & Panjaitan, T. (2022). Decision-making framework for construction clients in selecting appropriate procurement route. *Buildings*, 12(9), 1443.
- CRIF. (2025). *The great tension era: Navigating Indonesia's economic outlook for 2026*. Jakarta: CRIF Indonesia.
- Day, D. A., & Benjamin, N. B. H. (1991). *Construction equipment guide* (2nd ed.). New York, NY: John Wiley & Sons.
- Directorate General of Highways. (2025). *Tata cara penetapan persyaratan kualifikasi (LDK) paket pekerjaan konstruksi preservasi jalan dan jembatan* [Circular Letter No. 16/SE/Db/2025]. Jakarta: Ministry of Public Works, Directorate General of Highways.
- Fabozzi, F. J., & Peterson, P. P. (2003). *Financial management and analysis* (2nd ed.). Hoboken, NJ: John Wiley & Sons.
- Fitton, R., et al. (2008). Pay-per-use models and maintenance cost reduction in equipment rental. *Journal of Quality in Maintenance Engineering*, 14(3), 271–285.
- Ganec Swara. (2025). Analisis perbandingan biaya operasional alat berat milik sendiri dengan biaya sewa alat berat pada proyek pelebaran jalan Pemenang–Bayan I, Kabupaten Lombok Utara. *Ganec Swara*, 19(1).
- GBG Indonesia. (2025). *In-depth analysis: The Indonesian rupiah performance and outlook*. Jakarta: Global Business Guide Indonesia.
- GlobalData. (2025). *Indonesia construction industry report 2025: Forecasts to 2029*. London: GlobalData.
- Gottfredson, M., Puryear, R., & Phillips, S. (2005). Strategic sourcing: From periphery to the core. *Harvard Business Review*, 83(2), 132–139.
- Gransberg, D. D., Popescu, C. M., & Ryan, R. C. (2006). *Construction equipment management for engineers, estimators, and owners*. Boca Raton, FL: CRC Press.
- Gransberg, D. D., & Rueda-Benavides, J. A. (2020). *Construction equipment economics and management*. Boca Raton, FL: CRC Press.
- Griffin, J. (2002). The economics of equipment rental. *Construction Business Review*, 12(4), 44–51.

- Habibillah, M. (2023). Analisis perbandingan biaya penggunaan alat berat antara sistem sewa dan kepemilikan. In *Prosiding Seminar Nasional Politeknik Negeri Lhokseumawe*.
- Hammad, A. (2023). Long-term cost implications of renting versus buying construction equipment. *International Journal of Construction Management*, 23(6), 1012–1024.
- Horngren, C. T., Datar, S. M., & Rittenberg, L. (2015). *Cost accounting: A managerial emphasis* (15th ed.). Upper Saddle River, NJ: Pearson.
- Jung, M., et al. (2006). Equipment availability and rental rate volatility during peak demand. *Construction Management and Economics*, 24(9), 967–977.
- Jurnal Konstruksi. (2019). Perbandingan ekonomis pengadaan alat berat sistem sewa dan beli dalam pekerjaan konstruksi (Studi kasus: Proyek Ciplaz Garut). *Jurnal Konstruksi*, Institut Teknologi Garut.
- Kaufmann, L., Wagner, C. M., & Carter, C. R. (2017). Individual modes and patterns of rational and intuitive decision-making by purchasing managers. *Journal of Purchasing and Supply Management*, 23(2), 82–93.
- Latumaerissa, J. (2025). Public procurement 2025: Indonesia. In *Chambers global practice guides: Public procurement*. London: Chambers and Partners.
- Liu, X., Liu, Y., & Yang, Z. (2024). Preventive maintenance strategy selection for owned construction equipment. *Journal of Construction Engineering and Management*, 150(2), 04023170.
- Makridakis, S., Wheelwright, S. C., & Hyndman, R. J. (1998). *Forecasting: Methods and applications* (3rd ed.). New York, NY: John Wiley & Sons.
- Mao, C. K., & Zaleski, P. (2011). The lease-versus-buy decision and technological obsolescence. *Journal of Business & Economics Research*, 9(3), 21–30.
- Nikolarakos, C., & Georgopoulos, N. (2001). Sourcing: Issues to be considered for the make-or-buy decisions. *Operational Research*, 1(2), 161–179.
- Nunnally, S. W. (2007). *Construction methods and management* (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Peurifoy, R. L., Schexnayder, C. J., Shapira, A., & Schmitt, R. L. (2018). *Construction planning, equipment, and methods* (9th ed.). New York, NY: McGraw-Hill Education.
- Pham, H., et al. (2020). Renting construction equipment: Financial and operational considerations. *Journal of Financial Management of Property and Construction*, 25(2), 189–206.
- Rashid, K. A., et al. (2006). *Construction procurement and equipment acquisition*. Kuala Lumpur: Construction Research Press.
- Republic of Indonesia. (2021). *Undang-Undang Nomor 7 Tahun 2021 tentang Harmonisasi Peraturan Perpajakan* [Law No. 7 of 2021 on the Harmonisation of Tax Regulations]. Jakarta: State Secretariat of the Republic of Indonesia.

- Samee, K., & Pongpeng, J. (2016). Structural equation model for construction equipment management affecting project and corporate performance. *KSCE Journal of Civil Engineering*, 20(5), 1642–1656.
- Schoemaker, P. J. H. (1995). Scenario planning: A tool for strategic thinking. *Sloan Management Review*, 36(2), 25–40.
- Statista. (2024). *Producer price index of construction machinery in the European Union*. Hamburg: Statista.
- ter Brake, M. (2025). *Buy, rent, or lease (BRL) decision-making of construction equipment in the Dutch construction industry: A case study* (Master's thesis). Lappeenranta–Lahti University of Technology LUT, Lappeenranta.
- Turner & Townsend. (2025). *Indonesia's construction sector finds its footing*. London: Turner & Townsend.
- Universitas Gadjah Mada. (2025). *Rupiah depreciation could drive up prices of basic goods, transportation, and energy*. Yogyakarta: Universitas Gadjah Mada.
- Un-Noor, F., et al. (2022). Off-road construction and agricultural equipment electrification: Review, challenges, and opportunities. *Vehicles*, 4(3), 780–807.
- Van Weele, A. J. (2014). *Purchasing and supply chain management* (6th ed.). Andover: Cengage Learning.
- Waris, M., Panigrahi, S., Mengal, A., Soomro, M. I., Mirjat, N. H., Ullah, M., Azlan, Z. S., & Khan, A. (2019). An application of analytic hierarchy process (AHP) for sustainable procurement of construction equipment. *Sustainability*, 11(22), 6366.
- Woodward, D. G. (1997). Life cycle costing: Theory, information acquisition and application. *International Journal of Project Management*, 15(6), 335–344.

APPENDIX 1

EQUIPMENT P&L DATA STRUCTURE

The analysis draws on the per-unit equipment P&L maintained by the accounting and finance department, compiled monthly for each of the twenty-one units over January 2022 to June 2026 using the structure below. Not every line enters the model: depreciation is used only in the tax computation, and the financing line is excluded altogether, for the reasons set out in Sections 3.6 and 3.7.

Appendix Table A.1 Structure of the per-unit equipment P&L data

Field	Description	Use in the model
Unit ID	Identifier of the individual crawler crane or excavator.	Row key
Category	Crawler crane or excavator.	Grouping
Month / Year	Reporting month within the period (Jan 2022 to Jun 2026).	Period
Billable weeks	Weeks in the month in which the unit was on hire and billing.	Occupancy u (Table 4.3)
Revenue	Revenue earned by the unit in that month.	Contribution per week (cancels)
Depreciation	Monthly depreciation charged to the unit.	Tax computation only, via D
Financing cost	Monthly instalment and interest on any bank facility.	Excluded (Section 3.7)
Insurance	Monthly insurance cost of the unit.	Cash cost C
Repair and maintenance	Monthly repair and maintenance cost of the unit.	Cash cost C, avoidable part
Equipment P&L result	Revenue less total ownership cost for the month.	Reference only; not the decision measure

Source: company accounting and finance department.