



Asset Management Practices of Construction Companies in Batangas Province, Philippines

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Abstract

This study aimed to assess the asset management practices of construction companies registered under the Philippine Construction Accreditation Board (PCAB) in Batangas Province. The assessment focused on four key stages: business case, create or acquire, operate and maintain, and dispose of or replace. Company profiles were considered in terms of business ownership, classification, number of employees, asset size, and license category. A descriptive research design was employed using survey questionnaires and expert consultations. Respondents were fixed asset accountants or, when unavailable, managers knowledgeable in asset management. To determine significant differences in practices based on company profiles, the Kruskal-Wallis H-Test, a non-parametric statistical tool, was utilized. Results showed that most respondents were corporations (48.4%) engaged in general engineering services (52.4%), with 100 to 300 employees (29.8% and 27.4% respectively), asset sizes ranging from ₱30 million to ₱60 million (38.7%), and License B accreditation (29%). Among the asset management practices, the top activities included conducting long-term planning and investment summary analysis under business case (mean = 2.96), acquiring assets in bulk under create or acquire (mean = 3.76), conducting annual inventory counts under operate and maintain (mean = 3.52), and disposing of completely damaged fixed assets under dispose or replace (mean = 3.69). Significant differences were observed in most asset management practices when grouped according to company profiles, except for disposal practices, which showed no significant difference based on company classification. Based on these findings, a strategic policy framework was proposed to enhance asset management practices in construction firms.

Keywords: Asset Management; Asset Management Practices; Construction Companies.

1. Introduction

Asset management in construction involves creating an asset inventory, assessing current conditions and performance, determining and evaluating future system needs, evaluating and selecting appropriate strategies to address those needs, and evaluating the effectiveness of each strategy. Assets for construction companies includes property plant and equipment such as land, land improvements, buildings, building improvements, leasehold, leasehold improvements machineries, heavy equipment's, office equipment's, furniture, and fixtures, capitalizable tools, service vehicle, any tangible assets that meets the standard of the asset to capitalize and intangible assets which includes computer software's. Having an effective asset management utilization can lead the construction company to the top and become known in the market. Additionally, they can attract more clients and maintain a long-term presence in the industry, as competition in the construction sector intensifies. Effective asset management benefits also include improved financial performance, informed asset investment decision, managed risk, improved services, and output, demonstrated social responsibility, demonstrated compliance, enhanced reputation, improved organizational sustainability, and improved efficiency and effectiveness, reduced capital and maintenance cost, increased asset availability¹, (The Institute of Asset Management, 2015).

Asset management issues in the construction industry have become more pronounced as market competition intensifies. According to the Philippine Construction Accreditation Board's release for the third quarter of 2019, construction company rates have increased by up to 88 percent. According to categories, PCAB has proven that the top three are, category D has the biggest part of it with 36 percent of the increased rate, category AAAA2 with 24.21 percent, and category B with 20 percent rate. the best asset management utilization does the construction industry have a greater chance to more projects. When businesses in the construction industry do not properly track and manage their assets, they risk not only losing out on thousands to millions of dollars a year but also dealing with a flood of related issues. Construction brands without a solid asset management solution in place can expect to run across problems, which include decreased efficiency, equipment misallocation, missing and stolen inventory, unexpected equipment maintenance, downtime cost, compliance violations, and safety concerns (Asset Panda, 2017).

The reason for conducting this study is to assess the asset management practices of selected construction companies in Batangas Province. The researchers have observed and proven based on experience that mismanagement of assets in the construction industry can lead to tragic loss not only for the construction industry but also to the economy. Hence, it will be a shutdown for the company and a loss of job



opportunity for every construction worker. It is quite alarming since some workers here in the country are grouped to those blue-collar which the immense number of construction workers belong.

2. Background of the study

The primary objective of this study is to assess the asset management practices of construction companies in Batangas Province. Asset management has become an essential function within the global construction industry, especially in response to increasing demands for cost efficiency, infrastructure resilience, and sustainable development. In construction, asset management encompasses the systematic planning, acquisition, operation, maintenance, and disposal of physical and intangible resources such as machinery, equipment, buildings, vehicles, and software. These resources are fundamental to the delivery of construction projects on time, within budget, and at the required quality.

Globally, countries such as the United Kingdom, Australia, and Singapore have integrated asset management frameworks such as those aligned with ISO 55000 into both public and private construction projects. These frameworks ensure that asset decisions are based on long-term value, performance data, and risk mitigation strategies. In developed economies, asset management is often supported by digital technologies like Building Information Modeling, Geographic Information Systems, and Internet of Things-based monitoring tools. These systems allow for more precise tracking of asset performance, predictive maintenance, and better resource allocation, all of which are critical to improving productivity, reducing lifecycle costs, and ensuring infrastructure reliability (The Institute of Asset Management 2015).

In contrast, many developing countries, including the Philippines, are still in the early stages of institutionalizing structured asset management systems across the construction sector. The local industry, while growing rapidly, often lacks the technical, financial, and policy-based support to fully implement modern asset management practices. The Construction Industry Authority of the Philippines, established on November 28, 1980, was tasked to promote and regulate the development of the national construction industry by government's goals. One of its implementing arms, the Philippine Contractors Accreditation Board, oversees contractor licensing under Republic Act Number 4566, also known as the Contractor's License Law. These institutions lay the groundwork for improving construction quality and governance, but the integration of asset management into daily operations remains inconsistent across firms.

The construction sector in the Philippines relies heavily on high utilization of assets, particularly equipment, to ensure productivity and profitability. Construction equipment is among the most valuable physical assets of a construction firm and plays a central role in project execution. Effective utilization of these assets leads to increased efficiency, timely project delivery, and lower costs. Conversely, inadequate asset management, including subjective equipment decisions, lack of maintenance planning, and underutilization, can lead to project delays, budget overruns, and profit erosion. As noted in industry practice, common pitfalls such as overleveraging, tying up working capital in stagnant projects, and overinvesting in idle fixed assets can leave construction firms financially vulnerable, particularly when faced with unforeseen capital needs. These challenges highlight the critical need for effective asset management to ensure project success and business sustainability.

Batangas Province, selected as the focal point of this study, holds significant relevance both geographically and economically. Strategically located in the CALABARZON region, Batangas is one of the most industrialized and asset-rich provinces in the Philippines. It hosts numerous construction companies operating in residential, commercial, industrial, and infrastructure development. The proximity of the researcher to the area also facilitates data gathering and field validation. More importantly, understanding asset management practices in this province could yield insights applicable to other rapidly developing regions in the country.

By examining how construction firms in Batangas manage their assets across the lifecycle, including planning, acquisition, operation, and disposal, this study aims to identify gaps, best practices, and areas for improvement. The results may contribute to enhancing the overall capability of local construction firms, reducing inefficiencies, and supporting policy development aligned with both national and global asset management standards. Ultimately, strengthening asset management practices is not only vital for individual company performance but also for contributing to the broader goals of economic development, employment stability, and infrastructure sustainability in the Philippines.

3. Theoretical and conceptual framework

This study adopts the asset life cycle model outlined in the ISO 55000 Asset Management Standard (2014), which provides a structured and internationally recognized framework for managing physical and intangible assets. ISO 55000 has emerged as a global benchmark for asset-intensive sectors, especially construction, where effective asset utilization plays a critical role in achieving productivity, financial sustainability, and long-term value. As global infrastructure demands increase, construction firms across the world, including those in developed nations such as the United Kingdom, Australia, and Singapore, are aligning their practices with ISO 55000 to strengthen operational resilience, reduce life cycle costs, and improve risk management.

The ISO 55000 framework offers four fundamental phases in the asset life cycle: business case, create or acquire, operate and maintain, and dispose or replace. These phases provide a comprehensive view of how assets should be planned, developed, used, and eventually retired or replaced. Adopting this model enables organizations to strategically align their asset decisions with broader business goals and to optimize their resources over the long term.



Fig. 1: Asset Life Cycle.

While ISO 55000 has seen widespread adoption in developed economies such as the United Kingdom, Australia, and Singapore (Hastings, 2015), its relevance in resource-constrained settings—such as in many developing countries or underfunded organizations—requires further exploration. In these contexts, financial, technological, and human capital limitations often hinder comprehensive asset management implementation. However, the adaptability and scalability of the ISO 55000 standard present an opportunity for such organizations to embed asset management principles in a phased or prioritized manner (Amadi Echendu et al., 2010).

In resource-constrained environments, ISO 55000 can serve as a strategic decision-making tool to maximize the utility of limited assets, minimize operational disruptions, and enhance risk-based planning. Even in the absence of sophisticated digital systems, practices such as life cycle costing, criticality assessments, and performance-based maintenance can be adopted to extend asset life and reduce total cost of ownership (Hajjar & AbouRizk, 2002).

Moreover, the framework encourages a culture of proactive stewardship and long-term thinking, which is particularly vital where asset renewal cycles are slow due to budget constraints. When adapted contextually, ISO 55000 can aid construction firms and public sector agencies in low-income settings to shift from reactive, ad hoc maintenance to systematic, value-driven asset management, ultimately improving infrastructure reliability and public service delivery (World Bank, 2019).

Thus, while originally designed for sophisticated asset-intensive operations, the core principles of ISO 55000—strategic alignment, risk management, and performance optimization—remain applicable and transformative even in environments where resources are scarce. The key lies in scaling the model to fit organizational capacity, leveraging locally available data, and integrating asset management with institutional reforms and capacity-building initiatives.

The business case phase is foundational to asset management. It defines the need for an asset, outlines potential business opportunities, and supports evidence-based decision making. This phase goes beyond simple cost justification and incorporates strategic alignment, anticipated value, and long-term implications. It ensures that capital investments in construction equipment, property, or technology are grounded in clear organizational benefits.

The create or acquire phase involves the actual procurement or construction of the asset. This stage has the most significant impact on the total cost of ownership. Design decisions, supplier selection, and quality controls established during this phase influence the asset's future performance and maintenance requirements. This phase also emphasizes collaboration among engineering, procurement, project management, and finance teams to ensure that the asset will deliver its intended outcomes.

The operate and maintain phase is where the organization derives value from its assets. This is typically the longest phase in the asset life cycle, and it focuses on maximizing asset performance, ensuring availability, and reducing downtime. Effective practices during this phase include preventive maintenance, real-time monitoring, and the use of digital tools for performance tracking and optimization. While only a small portion of operational costs can still be influenced at this stage, continuous improvement and data-driven decisions can help extend asset life and improve reliability.

The dispose or replace phase occurs when an asset is no longer economically viable, technologically relevant, or aligned with operational needs. This phase includes the decommissioning, sale, recycling, or replacement of assets. If this stage is poorly planned or reactive, it can lead to unexpected expenses, safety risks, and disruption to operations. However, when aligned with a strategic asset management plan, this phase ensures smooth transitions and effective resource reallocation.

The relevance of this framework in the context of this study lies in its ability to guide the evaluation of asset management practices in construction companies operating in Batangas Province. By applying the ISO 55000 life cycle model, the study not only assesses current practices but also benchmarks them against international standards. This is particularly important in the Philippine context, where many construction firms operate without formalized asset management systems due to constraints in policy support, technical capacity, and awareness.

Integrating ISO 55000 into the local construction landscape enhances the understanding of how asset life cycle thinking can improve efficiency, minimize wastage, and support long-term sustainability. Moreover, by linking theoretical principles with empirical findings from local firms, the study generates actionable insights that can inform the development of policies, training programs, and investment strategies that elevate the asset management capability of construction enterprises not only in Batangas but across other fast-growing regions in the Philippines.

Ultimately, the adoption of this globally validated theoretical framework enhances the rigor of the study, supports evidence-based recommendations, and underscores the importance of aligning local practices with global standards to improve competitiveness and resilience in the construction industry.

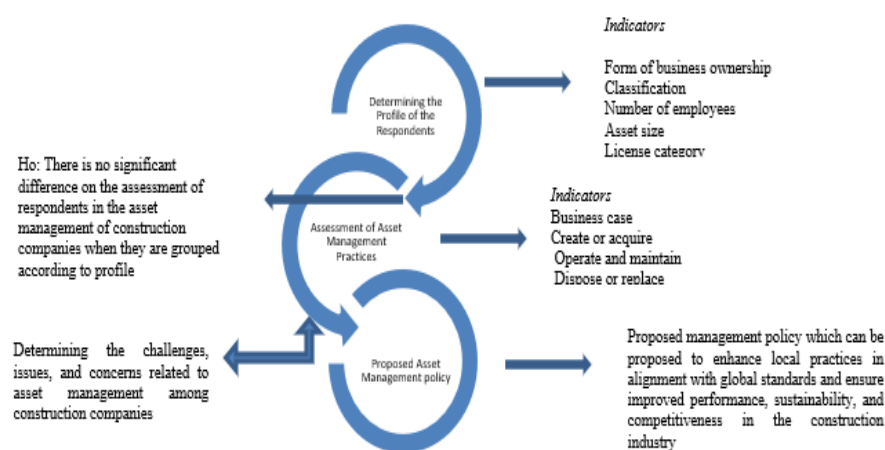


Fig. 2: Conceptual Framework.

In the increasingly competitive and globalized construction industry, effective asset management has become a cornerstone for operational efficiency, sustainability, and long-term profitability. The ISO 55000 Asset Management Standard provides an internationally recognized framework that guides organizations in managing their assets systematically throughout their life cycle. This study aims to assess the asset management practices of selected construction companies in Batangas Province. Specifically, it explores how firms manage their assets across the life cycle stages—namely business case, create or acquire, operate and maintain, and dispose or replace—and whether these practices are influenced by company characteristics such as form of business ownership, classification, number of employees, asset size, and license category. The study also seeks to identify the challenges encountered in implementing asset management systems and, ultimately, propose policy recommendations that align local practices with global standards to enhance the industry's competitiveness, sustainability, and performance.

The conceptual framework of this study is grounded on the input–process–output model. The input component consists of the profile of construction companies, which includes their form of business ownership (such as sole proprietorship, partnership, or corporation), classification (whether residential, commercial, industrial, or infrastructure-oriented), number of employees, asset size (referring to the overall value of tangible and intangible assets), and license category as governed by the Philippine Contractors Accreditation Board (PCAB). These organizational characteristics may influence how effectively firms manage their assets and implement asset management practices. The process component focuses on the four phases of the asset life cycle, based on the ISO 55000 standard: business case, create or acquire, operate and maintain, and dispose or replace. The business case phase centers on identifying the rationale and value proposition behind asset acquisition or improvement. The create or acquire phase involves decision-making on asset procurement, engineering, commissioning, and collaboration among stakeholders to ensure alignment with business goals. The operate and maintain phase covers the long-term use of the asset, including maintenance practices and performance optimization. The dispose or replace phase addresses asset decommissioning or replacement, which must be managed strategically to avoid financial losses or service disruptions.

The output component of the framework includes the assessment results, which highlight the strengths and weaknesses in current asset management practices across the selected companies. These results help identify significant differences in the asset management life cycle practices based on company profiles and uncover the challenges, issues, and concerns faced by the firms. The ultimate output is the formulation of an evidence-based asset management policy that supports local companies in improving their practices while also aligning with international benchmarks like the ISO 55000 series. This proposed policy is expected to enhance asset utilization, extend asset life span, reduce costs, and strengthen overall organizational performance.

The hypothesis guiding the study is that there is no significant difference in the assessment of asset management practices among construction companies when grouped according to their profile. This null hypothesis (H_{01}) will be tested statistically, potentially using analysis of variance (ANOVA) or similar methods, to determine whether organizational characteristics have a measurable effect on asset management implementation. The conceptual framework is essential for guiding the research process, from data collection to interpretation of results. It provides a structured approach for linking theoretical standards with practical observations in the local context. More importantly, it enables the researcher to understand how global standards can be operationalized in developing regions like Batangas and offers insights for future policy development and industry regulation. Through this framework, the study contributes to bridging the gap between global asset management innovations and the evolving needs of the local construction sector.

4. Research methodology

This study employed a descriptive research design to gather relevant data and assess the current asset management practices of selected construction companies in Batangas Province. The descriptive method was deemed the most suitable approach, as it effectively describes and interprets the existing conditions and practices of the respondents. It also provides valuable insights by highlighting trends, patterns, and differences that may exist among various construction firms. This methodology allowed the researcher to explore the actual practices being implemented about asset management and determine which areas may require improvement, thereby identifying the best practices suitable for the local context. Furthermore, the descriptive method followed a systematic process of data collection, ensuring that accurate and relevant information was obtained to directly address the research questions.

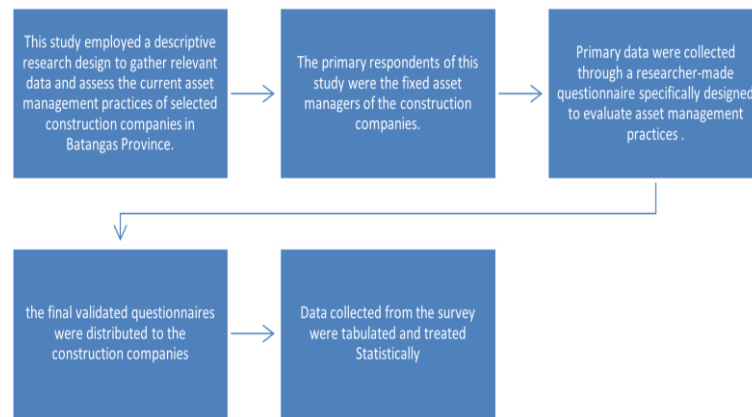


Fig. 3: Research Methodology.

The primary respondents of this study were the fixed asset managers of the construction companies. In instances where fixed asset managers were unavailable, company owners were selected to represent the firms. All participating companies were registered and accredited by the Philippine Contractors Accreditation Board (PCAB) and were operating within Batangas Province. These respondents were considered the most appropriate sources of information, as they are directly involved in managing fixed assets across the four key phases of the asset life cycle, as outlined in the ISO 55000-based theoretical framework: business case, create or acquire, operate and maintain, and dispose or replace. Their experiences, insights, and opinions provided the foundation for understanding asset management practices in the region.

The study used a confidence level of 95% with a 5% margin of error. A response distribution of 50% was assumed to determine the sample size, which yielded a required total of 124 respondents. All 124 targeted respondents completed the survey, ensuring a full response rate and increasing the reliability and validity of the data gathered.

Primary data were collected through a researcher-made questionnaire specifically designed to evaluate asset management practices related to fixed assets in PCAB-accredited construction companies in Batangas Province. The development of the questionnaire was guided by a thorough review of existing literature, as well as previous studies related to asset management in the construction industry. The initial draft of the instrument underwent a rigorous validation process. It was first reviewed by the researcher's thesis adviser, then validated by a panel of faculty experts and a statistician to ensure both content and construct validity. A dry run was conducted with construction companies located outside Batangas Province—specifically in nearby areas such as Cavite, Laguna, and Rizal—to further test the instrument's reliability. The questionnaire administration took place during the second semester of the academic year 2018–2019. The responses from the dry run were statistically analyzed, and the reliability test produced a Cronbach's alpha of 0.983, indicating excellent internal consistency. For the actual survey, the final validated questionnaires were distributed to the construction companies in Batangas Province, using the official list provided by PCAB. These response options were coded numerically and used to compute mean scores, which were then interpreted using a predetermined range to indicate the level of implementation of asset management practices.

Data collected from the survey were organized using a master tally sheet to facilitate easy tabulation and analysis. Descriptive statistics, including frequency and mean, were used to summarize and interpret the data. To determine whether significant differences existed in asset management practices when companies were grouped according to their profiles, the Kruskal-Wallis H Test was employed. This non-parametric test was selected due to its appropriateness for comparing multiple independent groups with ordinal data, such as Likert-scale responses. The use of this statistical tool allowed for a more robust interpretation of the relationship between company characteristics and their implementation of asset management across the four life cycle phases.

This study explored the profile of construction companies in Batangas Province, specifically examining their form of business ownership, classification, number of employees, asset size, and license category. Understanding these characteristics helps clarify how structural and organizational factors influence the practice and quality of asset management in the construction sector, both locally and globally.

5. Results and discussions

5.1. Profile of the respondents

Among the 124 licensed construction companies that participated in the survey, 48.4 percent (60 respondents) were corporations, 43.5 percent (54 respondents) were partnerships, and only 8.1 percent (10 respondents) operated as sole proprietorships. These findings suggest that corporations dominate the construction industry in Batangas. This is significant because corporations tend to have more structured organizational systems and stronger financial backing, which are critical in implementing robust asset management systems. Globally, studies have shown that corporate-owned firms are more likely to adopt standards such as ISO 55000 due to their need for compliance, transparency, and competitiveness in both domestic and international markets. The ISO 55000 standard itself is designed to align with the governance and operational scale typically found in corporate entities.

In terms of business classification, the majority of construction companies were engaged in General Engineering, accounting for 52.4 percent (65 companies). This was followed by General Building firms with 31.5 percent (39), SP-Trade firms with 9.6 percent (12), and Specialty contractors at 6.5 percent (8). The dominance of General Engineering firms can be attributed to the demand for large-scale infrastructure and civil engineering projects in both local and national contexts. Batangas, being a developing province with numerous industrial and commercial hubs, presents a high demand for general engineering services. This mirrors trends in emerging economies where civil infrastructure development is prioritized. The presence of top engineering schools in the region also contributes to the availability of skilled professionals, which supports the growth of engineering-oriented construction firms.

Regarding workforce size, 40.3 percent of the firms employed 10 to 99 workers, followed by 29.8 percent with 100 to 199 employees, 27.4 percent with 200 to 299 employees, and only 1.7 percent with 300 or more employees. This indicates that most firms fall within the small to medium enterprise (SME) category. Contrary to the assumption that more employees are required to manage large-scale projects, the

findings suggest that firms can operate effectively with a smaller workforce by leveraging fixed assets such as heavy equipment, machinery, and digital systems. This aligns with global industry shifts where automation and digital asset tracking systems reduce dependency on manual labor. According to Thibodeaux (2017), while manpower remains essential, the integration of asset-driven technologies significantly enhances productivity and reduces operational costs, especially in asset-intensive industries like construction.

In terms of asset size, 38.7 percent of the surveyed companies were owned either by corporations or partnerships, indicating larger operational scales and capital investment. The bigger the company, the greater the demand for sophisticated asset management practices to ensure cost-effectiveness, asset reliability, and regulatory compliance. As Ballada (2010) outlined, businesses are categorized by asset size: micro-enterprises have assets not exceeding PHP 3 million; small enterprises, between PHP 3 million and 15 million; and medium enterprises, between PHP 15 million and 100 million. The construction firms in Batangas generally fall into the small and medium categories, consistent with their employee size and business classification. However, some companies display large-scale operations indicative of evolving business models transitioning into larger asset bases.

License categories, as classified by the Philippine Contractors Accreditation Board (PCAB), also reveal the capacity of firms to handle complex projects. The most common among the surveyed companies was Category B, which had 29 percent of the respondents. Firms in this category typically handle general building construction and are well-represented in the local industry due to increasing demand for residential, commercial, and industrial infrastructure. On the other hand, very few firms achieved higher license categories, such as AAAA, which requires a minimum equity of one billion pesos. Globally, licensing systems serve as regulatory benchmarks to ensure contractors meet specific financial, managerial, and technical standards. In developed economies such as the United States and Australia, firms with higher licensing classifications are expected to adhere to stricter asset management protocols, reinforcing the need for robust asset control, maintenance, and sustainability strategies.

According to PCAB, there was a recorded increase in the number of construction projects in the Philippines, with 39,762 constructions in the first quarter of 2019—an increase of 10.4 percent from the same period in 2018. This growth highlights the intensifying need for efficient asset management as firms scale up operations. Construction companies that fail to manage their assets effectively risk financial instability, delays, and project failures. Therefore, this study reinforces the importance of institutionalizing comprehensive asset management systems that not only respond to local business profiles but are also aligned with international standards like ISO 55000. By doing so, local firms in Batangas and similar developing regions can improve performance, competitiveness, and sustainability in an increasingly globalized construction market.

5.2. Asset management practices of construction companies

This section presents the assessment of asset management practices among construction companies in Batangas Province based on four key phases of the asset life cycle: business case, create or acquire, operate and maintain, and dispose or replace. These phases are aligned with international standards such as ISO 55000, which highlights that asset management is a coordinated activity involving the balancing of costs, risks, opportunities, and performance benefits to achieve organizational objectives.

The study revealed that the business case phase had a composite mean of 2.77, interpreted as "practiced." The findings show that long-term planning for budgeting and conducting investment summary analyses ($M = 2.96$), securing authorized approvals through management reviews ($M = 2.94$), and analyzing the asset's return on investment ($M = 2.81$) were the most frequently practiced activities. These practices highlight that strategic planning before asset acquisition is a key element in the decision-making process. Globally, this aligns with best practices identified by Campbell and Jardine (2011), who emphasized that developing a sound business case can enhance profitability and improve an organization's competitive edge by ensuring resources are allocated efficiently.

However, the study also identified the least-practiced activities, which include preparing detailed financial or economic evaluation reports ($M = 2.75$), analyzing potential failure risks ($M = 2.73$), and preparing savings summary reports ($M = 2.56$). These lower ratings suggest that while companies engage in general planning, they may lack rigorous financial or risk-based assessments. In global practice, such gaps can impact a firm's long-term sustainability and financial performance, as highlighted by ISO 55000, which promotes a systematic and evidence-based approach to asset-related decisions.

For the create or acquire phase, the study recorded a composite mean of 3.04, indicating that this phase is generally practiced among construction companies. The highest-rated practice was acquiring assets in bulk to avail of discounts ($M = 3.76$), followed by verifying asset quality before acquisition ($M = 3.18$). These practices show a practical and cost-sensitive approach to asset procurement. According to Peterson (2011), all costs incurred to make an item of property, plant, and equipment ready for use should be capitalized, reinforcing the importance of accounting for total acquisition costs. Globally, organizations strive to optimize procurement by evaluating life-cycle costs and ensuring that purchases align with long-term operational goals.

In terms of operating and maintaining assets, the study reported a composite mean of 2.97. This suggests that maintenance and operational practices are recognized as vital by construction companies in Batangas. Globally, the maintenance of physical assets is critical in reducing downtime, ensuring safety, and extending asset life. Peterson (2011) emphasizes that preventive maintenance is essential to maintain equipment accuracy and reduce production costs. Similarly, in both public and private sectors, the maintenance of infrastructure assets is a key element of effective service delivery, as poor maintenance can lead to higher long-term costs and safety risks.

Lastly, the dispose or replace phase received a composite mean of 2.98. This finding indicates that construction firms consider asset disposal and replacement an integral part of their management cycle, although possibly not as systematic as required under global standards. Effective disposal not only frees up storage and financial resources but also aligns with environmental and regulatory standards. The Mogale City Fixed Asset Management Policy (2018) provides an international example of how structured disposal procedures are implemented by supply chain management regulations, ensuring that obsolete and unserviceable assets are removed in a manner that minimizes losses and promotes accountability.

5.3. Results of inferential analysis to test the hypothesis

The study revealed statistically significant differences in asset management practices across construction firms in Batangas Province when grouped according to several organizational characteristics, including form of business ownership, classification, number of employees, asset size, and license category. These findings affirm that asset management is not uniformly practiced across the industry and is influenced by structural and operational factors.

Among the various forms of business ownership, corporations exhibited the highest levels of asset management practices in the business case phase, with a mean rank of 79.05, followed by partnerships (mean rank = 51.20) and sole proprietorships (mean rank = 24.20). This result implies that the more formal and structured a company's ownership, the more likely it is to adopt systematic and comprehensive asset

management processes. Corporations, due to their legal personality and access to greater capital, often have more sophisticated asset planning, procurement, and review mechanisms. Globally, this mirrors findings from the Institute of Asset Management (IAM), which emphasizes that governance structures in larger organizations support integrated asset management frameworks that align with ISO 55000 standards (IAM, 2015).

In terms of business classification, the study found that the dispose or replace phase showed no significant difference ($p > 0.05$, specifically $p = 0.061$) when construction firms were grouped by their classification—general engineering, general building, specialty, and SP-trade. The mean ranks ranged from 67.25 (general engineering) to 42.33 (SP-trade), with a total Chi-square value of 7.577. This indicates that asset disposal and replacement are not distinguishing practices across different construction specialties. One plausible explanation is that disposal activities in the construction sector are typically project-dependent and often delayed until the end of a project cycle or when an asset is damaged or obsolete. This insight is echoed in studies from the UK's Infrastructure and Projects Authority (2017), which noted that many construction firms focus more on the acquisition and operation of assets, while end-of-life strategies such as replacement and disposal tend to be reactive rather than proactive.

Conversely, significant differences were found in the business case, create or acquire, and operate and maintain phases of asset management when companies were grouped according to classification. These differences may be attributed to the nature and complexity of work performed under each classification, which influences how firms plan, procure, and maintain their assets. For example, general engineering firms may require more intensive planning and operation procedures due to the scale of their infrastructure projects, compared to specialized contractors with narrower scopes.

The study also found significant differences in asset management practices across all four phases when firms were grouped according to the number of employees, with p-values below 0.05. Firms with 100–199 employees demonstrated higher adherence to asset management practices compared to those with fewer than 99 employees. This supports the argument that as organizational scale increases, so does the complexity of asset management, requiring more robust systems and processes. Globally, larger firms are more likely to invest in dedicated asset management teams and digital tools such as Enterprise Asset Management (EAM) software to support these functions (Gartner, 2023).

Asset size also showed a significant impact on the adoption of asset management practices. Companies with larger asset bases tended to implement more rigorous and structured asset management systems. This finding aligns with the Philippine Contractors Accreditation Board (PCAB) licensing system, which links asset size to license category. Higher license categories, such as Category A and AAA, are granted to firms with greater financial capacity and asset holdings, enabling them to undertake large-scale projects. Accordingly, the study shows that in the business case phase, firms with Category A licenses had the highest mean rank of 114.04, followed by AAA (105.80), AA (97.00), B (69.78), C (59.80), D (43.71), and Trade (19.17). This pattern is consistent across other phases: for create or acquire, Category A leads with a mean rank of 100.00; for operate and maintain, Category A again tops the list with a mean rank of 111.15.

6. Proposed output

The construction industry is asset-intensive and highly dependent on the strategic management of physical resources. As revealed in the study, while construction firms in Batangas Province exhibit good asset management practices, there is still room to align local practices with internationally recognized standards. The proposed Asset Management Policy Framework serves as a guide for local firms to elevate their operational effectiveness, sustainability, and competitiveness on both domestic and global fronts.

Table 1: Proposed Asset Management Policy Framework (Local to Global Alignment)

Policy Component	Local Practice Enhancement	Global Alignment
Asset Lifecycle Planning	Mandate the use of asset lifecycle planning tools for budgeting and investment decisions	ISO 55000-compliant lifecycle framework
Standardized Acquisition Protocols	Require cost-benefit analysis and supplier vetting for asset purchases	Reflects global best practices in procurement (e.g., World Bank standards)
Preventive Maintenance Systems	Enforce scheduled maintenance and tracking of asset conditions	Aligns with ISO 55001 preventive maintenance standards
Disposal & Replacement Planning	Establish criteria for asset decommissioning and replacement	Incorporates sustainability and circular economy principles
Digital Asset Management	Encourage adoption of BIM and EAM tools	Mirror practices in advanced economies like Singapore and Finland

The proposed policy framework encourages local construction firms to transition from traditional to strategic asset management, incorporating both financial discipline and technological innovation. By aligning with global benchmarks such as ISO 55000, firms not only increase operational efficiency but also position themselves for opportunities in international markets. Ultimately, this framework aims to ensure long-term sustainability, risk mitigation, and enhanced performance in an increasingly competitive and environmentally conscious global construction landscape.

7. Conclusions

Based on the study's findings, the following conclusions were derived:

- 1) The majority of construction firms in Batangas Province registered under the Philippine Contractors Accreditation Board (PCAB) operate as corporations, followed by partnerships. This indicates a preference for structured and capital-intensive forms of ownership that support large-scale operations in the construction sector.
- 2) Construction firms in the province generally practice asset management across the four critical phases: business case analysis, acquisition, operation and maintenance, and disposal or replacement. Among these, the Create or Acquire phase had the highest average rating (mean = 3.04), highlighting that construction companies are most vigilant when financial resources are directly involved. This aligns with global trends, where capital-intensive industries prioritize asset procurement and lifecycle cost analysis to maximize investment value.
- 3) There are statistically significant differences in asset management practices based on business ownership, employee size, asset size, and PCAB license category. However, the Dispose or Replace phase showed no significant difference when grouped by company

classification, suggesting that many firms may not prioritize or formalize end-of-life asset strategies—an issue also seen in emerging economies, where disposal planning is often underdeveloped.

- 4) In response to these findings, tailored asset management strategies and policy frameworks were formulated for each asset lifecycle phase. These strategies were designed to improve internal efficiency, standardize asset procedures, and elevate local practices to be more globally competitive. Updated tools, templates, and reporting mechanisms were also identified as essential support structures.

8. Recommendations

To address the gaps and support the advancement of the construction sector in Batangas—and the Philippines at large—the following actions are recommended:

- 1) Prospective investors should consider forming partnerships or corporations to pool financial resources. This collaborative approach is more sustainable and scalable for entering the construction industry, which requires significant capital for asset acquisition and operations.
- 2) Business owners, managers, and asset accountants must adopt formalized and globally aligned asset management practices. This includes implementing frameworks such as ISO 55000, which promote value-driven, lifecycle-focused asset planning and management.
- 3) The Philippine Contractors Accreditation Board (PCAB), in collaboration with industry associations and international partners, should offer regular training, certifications, and technical seminars. These programs should address topics such as:
 - Asset lifecycle costing
 - Predictive maintenance techniques
 - Risk assessment in asset planning
 - Disposal and replacement strategies
 - Compliance with international standards (ISO 55000/55001)
- 4) Future scholars should expand the scope of this study to include other variables such as intangible assets, environmental impact of asset usage, and digital asset management systems. Comparative studies involving international benchmarks can also offer insights for continuous improvement.
- 5) National agencies such as the Department of Public Works and Highways (DPWH) and the National Economic and Development Authority (NEDA) should incorporate ISO 55000-based asset life cycle principles into infrastructure planning, budgeting, and monitoring guidelines.
- 6) The Philippine Contractors Accreditation Board (PCAB) and the Construction Industry Authority of the Philippines (CIAP) should align accreditation, compliance, and capacity development programs with ISO 55000 and other ASEAN-recognized frameworks.
- 7) Government infrastructure projects funded by the General Appropriations Act (GAA) or ODA loans should require detailed asset management plans as part of project approval and monitoring processes.
- 8) Integrate ASEAN-wide asset performance and sustainability indicators into the M&E systems of construction and infrastructure projects to promote benchmarking and continuous improvement.

References

- [1] Amadi-Echendu, J., Willett, R., Brown, K., & Shemilt, S. (2010). Asset Management in Resource-Constrained Environments. *Journal of Quality in Maintenance Engineering*, 16(3), 228–240.
- [2] Asset Panda (2017). The Importance of Asset Tracking in the Construction Industry. Retrieved from <https://www.assetpanda.com>.
- [3] Asset Panda. (2017) “How Asset Tracking Helps Construction Companies Increase Revenue and Avoid Unnecessary Problems. Head Quarter Office: 3001 Dallas Parkway, Suite 590, Frisco, Texas 75034.
- [4] Asset Panda. (2017). The importance of asset tracking in the construction industry. Retrieved from <https://www.assetpanda.com>.
- [5] Ballada, W. (2010). *Entrepreneurial management*. DomDane Publishing.
- [6] Ballada, W.L. (2010). “Basic Accounting Made Easy,” Domdane Publishing and Made Easy Books.
- [7] Ballada, W.L. (2011), “Partnership and Corporation Accounting”, Domdane Publishing and Made Easy Books, Copyright 2010, 2010 Issue-15th Edition.
- [8] Campbell J.D., Jardine, A.K.S., Mcglynn, J., “Asset Management Excellence Optimizing Equipment Life-Cycle Decisions, Second Edition, CRC Press. BOCA Raton, London, New York.
- [9] Campbell, J. D., & Jardine, A. K. S. (2011). *Asset management excellence: Optimizing equipment life-cycle decisions* (2nd ed.). CRC Press.
- [10] Construction Industry Authority of the Philippines CIAP (1980). Mandate and Functions under Presidential Decree No. 1746. Retrieved from <https://www.dti.gov.ph/programs-projects/ciap/> Copyright 2010, 2010 Issue-15th Edition.
- [11] Federal Highway Administration. (2019). Asset Management Overview. U.S. Department of Transportation. <https://www.fhwa.dot.gov/asset/>.
- [12] Gartner. (2023). Market Guide for Enterprise Asset Management Software. Retrieved from <https://www.gartner.com/en>.
- [13] Global Infrastructure Hub. (2022). Reference Tool on Asset Management. Retrieved from <https://www.gihub.org>.
- [14] Hajjar, B., & AbouRizk, S. M. (2002). Unified Modeling Methodology for Construction Simulation. *Journal of Construction Engineering and Management*, 128(2), 174–185. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2002\)128:2\(174\)](https://doi.org/10.1061/(ASCE)0733-9364(2002)128:2(174)).
- [15] Hastings, N. A. J. (2015). *Physical Asset Management: With an Introduction to ISO 55000*. Springer.
- [16] Infrastructure and Projects Authority. (2017). *Transforming Infrastructure Performance*. UK Government. Retrieved from <https://www.gov.uk/government/publications/transforming-infrastructure-performance>.
- [17] Infrastructure Australia. (2021). *Australian Infrastructure Plan*. Retrieved from <https://www.infrastructureaustralia.gov.au>.
- [18] Institute of Asset Management (IAM). (2015). *Asset Management – An Anatomy* (2nd ed.). IAM.
- [19] International Organization for Standardization ISO (2014). ISO 55000 2014 Asset Management Overview Principles and Terminology. Retrieved from <https://www.iso.org/standard/55088.html>.
- [20] International Organization for Standardization. (2014). ISO 55000: Asset management – Overview, principles and terminology. ISO Central Secretariat.
- [21] International Organization for Standardization. (2014). ISO 55000: Asset management — Overview, principles and terminology. ISO Central Secretariat.
- [22] International Organization for Standardization. (2014). ISO 55000: Asset management — Overview, principles and terminology. ISO.
- [23] International Organization for Standardization. (2014). ISO 55000: Asset Management – Overview, Principles, and Terminology. ISO.
- [24] ISO (2014). ISO 55000: Asset Management – Overview, Principles and Terminology. International Organization for Standardization.
- [25] ISO 55000:2014, (2014) “Asset Management Standard: Overview, Principles and Terminology.
- [26] Manila.
- [27] Mogale City Local Municipality. (2018). *Fixed Asset Management Policy*. Retrieved from <https://www.mogalecity.gov.za>.

- [28] Peterson R. H. (2012), "Accounting for Fixed Assets" 2ND Edition, ISBN 0-471- 09210-X. John.
- [29] Peterson, D. (2011). Accounting for fixed assets. Wiley.
- [30] Philippine Construction Accreditation Board. (2019). Industry statistics: Q3 report. Construction Industry Authority of the Philippines• The Institute of Asset Management (2015). Asset Management An Anatomy, Second Edition. Retrieved from <https://theiam.org/knowledge/Anatomy/>.
- [31] Philippine Contractors Accreditation Board (PCAB). (2019). PCAB licensing categories and construction statistics. Construction Industry Authority of the Philippines (CIAP). Retrieved from <https://www.pcab.gov.ph>.
- [32] Philippine Contractors Accreditation Board (PCAB). (2023). Contractor Licensing Guidelines. Retrieved from <https://construction.gov.ph>.
- [33] Philippine Contractors Accreditation Board PCAB (2019). Industry Statistics Third Quarter Report Construction Industry Authority of the Philippines. Retrieved from <https://www.pcab.gov.ph>.
- [34] Philippine Statistics Authority (PSA). (2019). Construction statistics from approved building permits: First quarter 2019. Retrieved from <https://psa.gov.ph>.
- [35] Presidential Decree (PD) No. 1746," Creating Construction Industry in the Philippines" 5F Executive Building Center, 369 Sen. Gil J. Puyat Ave, Makati, 1209 Kalakhang Maynila.
- [36] The Institute of Asset Management, (2015)"Asset Management an Anatomy".
- [37] The Institute of Asset Management. (2015). Asset management – An anatomy (2nd ed.). Retrieved from <https://theiam.org>.
- [38] Thibodeaux, W. (2017). The impact of manpower on productivity. Chron Small Business. Retrieved from <https://smallbusiness.chron.com/impact-manpower-productivity-22687.html>.
- [39] Thibodeaux. W. (2017), "The Importance of Company Manpower", Retrieved From <http://smallbusiness.chron.com/importance-company-manpower/>.
- [40] Too, E., Betts, M., & Kumar, A. (2014). A framework for strategic infrastructure asset management. International Journal of Project Management, 32(4), 560–572. <https://doi.org/10.1016/j.ijproman.2013.09.003>.
- [41] Version 3, www.IAM.org, St Brandon House, 29 Great George Street Bristol, BS1 5QT, United Kingdom. Philippine Construction Accreditation Board (PCAB), RA4566 "Contractors License Law".
- [42] World Bank (2019). Infrastructure Asset Management: A Practitioner's Guide. Washington, D.C.: World Bank Group. <https://openknowledge.worldbank.org/>.
- [43] World Economic Forum. (2020). Shaping the Future of Construction: A Breakthrough in Mindset and Technology. Retrieved from <https://www.weforum.org>.