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Asset Management Maturity and Lifecycle Practices based on Stakeholders' Feedback

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Abstract *— This research investigates the maturity and performance of asset management systems and lifecycle practices in private Higher Education Institutions (HEIs) in Cabanatuan City, Philippines, using stakeholders' feedback. In particular, it evaluates how institutional policies, data and information management, and monitoring of performance contribute towards the application of the Asset Lifecycle Management (ALM) Model. Employing a descriptive research design, information was collected via survey questionnaires administered to 120 respondents (heads, and faculty and staff). Findings indicate that the asset management system in terms of strategy and policy is very satisfactory, signifying well-defined and established guidelines. Data and information management, as well as performance management, are merely satisfactory, hinting at improvement in data integration, training, and ongoing performance assessment. The ALM model itself fares no better, being rated as satisfactory with standardized lifecycle assessment processes in place, but with little sustainability integration and strategic alignment. The findings go a long way to emphasize the need to institutionalize end-to-end asset management strategies that leverage data analytics, stakeholder engagement, and long-term planning. The research offers empirical evidence that can be used to advise policy changes and capacity development efforts aimed at enhancing asset management and sustainability within higher education institutions.*

Keywords *— **ALM model, asset management maturity, lifecycle practices, private HEIs, stakeholders***

I. INTRODUCTION

Effective physical asset management in private HEIs is more and more vital as they aim to maximize resources, achieve sustainability, and harmonize their operations with strategic objectives (Chen et al., 2020). For this purpose, the Asset Lifecycle Management (ALM) Model (Roda, Macchi & Albanese, 2020) has become a crucial model for managing assets across their whole life cycle, from acquisition to use and maintenance to eventual decommissioning (Oh & Kim, 2020). Nevertheless, there is limited empirical evidence assessing comprehensively how ALM is supported and practiced in policy, data handling, and performance areas within the HEI context. This study is proposed to fill that gap.

This study sought to measure the existing practice of asset lifecycle practice in private HEIs by surveying three related components: institutional policy and strategy, data and information management, and performance management. These aspects are likely to have a major effect on the extent to which the ALM model is implemented at various functional levels within the organization (Kaewunruen, Sresakoolchai & Zhou, 2020). Knowing how these dimensions interact will better describe asset lifecycle effectiveness in education.

Initial observations indicate that even if most institutions have basic systems in place, the level of integration, stakeholder engagement, and strategic linkage will differ significantly. In addition, there has been an increasing awareness of enhancing sustainability practices, risk mitigation strategies, and

data analytics in decision-making regarding assets. These areas were scrutinized in the research to explore the strengths and areas of improvement in ALM implementation (Wekwete, Kufakunesu & van Zyl, 2023).

This research utilized quantitative data analysis to measure perceptions and practices across institutional heads, faculty, and staff, focusing on their experiences and evaluations of asset management strategies. The insights gathered are expected to contribute to a clearer understanding of how ALM is being applied in real-world HEI settings and what systemic or operational improvements might be necessary to support its full adoption.

This study specifically addressed and answered the following questions:

1. How may the asset management (physical assets/facilities) of the HEIs be described in terms of the Asset Management Maturity Model?

2. How may the asset lifecycle management in the HEIs be described by the respondents?

II. METHODOLOGY

A descriptive research design was used in this study. Posinasetti (2014) stated that a descriptive study is one in which information is collected without changing the environment (i.e., nothing is manipulated). It is used to obtain information concerning the status of the phenomena to describe "what exists" to variables or conditions in a situation. The methods involved range from the survey, which describes the status quo, to the correlation study, which investigates the relationship between variables, to developmental studies that seek to determine changes over time.

The respondents of the study are from private higher education institutions (HEIs) within Cabanatuan City, Philippines. The total number of respondents is 120, with 30 people from the group of the Heads and 90 from the faculty and staff.

This study used a survey questionnaire intended for the heads, faculty, and staff of selected private HEIs in Cabanatuan City. The questionnaire is divided into two parts. Part 1 of the questionnaire is composed of items on the asset management maturity level indicators (policy and strategy, data and information management, and performance management), and Part 2 is about the asset lifecycle management model. The instrument was content validated by 5 experts in the field, while the reliability was established using Cronbach's alpha with a coefficient of 0.856.

Appropriate statistical tools were used to treat the data gathered. The study covers one academic year.

III. RESULTS AND DISCUSSION

1. Asset Management System for Physical Assets/Facilities

Table 1. *Asset Management System for Physical Assets/Facilities in Terms of Policy and Strategy*

No.	Policy and Strategy	Heads		Faculty and staff		Combined	
		W.m	V.D	W.m	V.D	W.m	V.D
1.	Have a clear, comprehensive, and easily understandable guidelines outlining the acceptable use of assets within the institution, covers everything from procurement procedures to disposal policies.	3.43	s.a/v.s	**3.53**	**s.a/v.s**	**3.48**	**s.a/v.s**

2.	Implement a system for accurately identifying, tracking, and inventorying all institutional assets.	3.27	s.a/v.s	3.40	s.a/v.s	3.33	s.a/v.s	
3.	Have defined procedures for acquiring new assets, including approval processes, budgeting considerations, and vendor selection criteria. Emphasize transparency, accountability, and adherence to budgetary constraints.	**3.47**	**s.a/v.s**	3.50	s.a/v.s	**3.48**	**s.a/v.s**	
4.	Have an established asset management objectives aligned with the institution's strategic goals.	3.40	s.a/v.s	3.40	s.a/v.s	3.40	s.a/v.s	
5.	Have designated resources (human, financial, technological) allocated specifically for the implementation of asset management strategies.	3.40	s.a/v.s	3.43	s.a/v.s	3.42	s.a/v.s	
6.	The asset management policy of the institution is communicated effectively to all relevant stakeholders, including staff, faculty, and administration.	3.33	s.a/v.s	3.44	s.a/v.s	3.39	s.a/v.s	
7.	Conducts regular reviews and Assessments of asset management practices to ensure alignment with institutional objectives.	3.33	s.a/v.s	3.46	s.a/v.s	3.39	s.a/v.s	
8.	The asset management objective within the institution are SMART (Specific, Measurable, Achievable, Relevant, Time-bound).	3.30	s.a/v.s	3.34	s.a/v.s	3.32	s.a/v.s	
9.	Actively engages stakeholders in the development and review of asset management policies and strategies.	**3.17**	**a/s**	**3.31**	**a/s**	**3.24**	**a/s**	
10.	The asset management strategy within the institution is aligned with industry standards and best practices.	3.37	s.a/v.s	3.40	s.a/v.s	3.38	s.a/v.s	
	Overall Weighted Mean	3.35	s.a/v.s	3.42	s.a/v.s	3.38	s.a/v.s	

Legend: 3.25-4.00 strongly agree (s.a)/very satisfactory (v.s) 2.50-3.24 agree (a)/satisfactory (s) 1.75-2.49 moderately agree (m.a) 1.00-1.74 disagree (d)

Table 1 outlines the asset management system of private HEIs for physical assets/facilities in terms of policy and strategy. The overall weighted mean for the Asset Management System of private HEIs for physical assets/facilities in terms of policy and strategy is 3.35, 3.42, and 3.38, respectively, which is categorized as "strongly agree/very satisfactory." This information indicates that there is an established policy and strategy within the private HEIs.

From data collected from the heads of Higher Education Institutions (HEIs) on their Asset Management System for physical assets and facilities, some important insights surface on policy and strategy implementation. The most highly rated item, 3. "Have defined procedures for acquiring new assets, including approval processes, budgeting considerations, and vendor selection criteria." Highlight transparency, accountability, and staying within budget limitations." with a weighted mean of 3.47 and labeled by as "strongly agree/very satisfactory," addresses the presence of well-defined procedures for procuring new assets. These encompass clear approval mechanisms, budgetary considerations, and vendor selection criteria. The highlighting of transparency, accountability, and staying within budgetary limitations suggests a solid system in place among these HEIs. This high rating suggests that institutions prioritize structured and accountable processes for asset acquisition, ensuring that new investments align with strategic goals and financial plans (Li, 2023).

For staff and faculty, Item 1 received the most highly weighted mean of 3.53 and was labeled as "strongly agree/very satisfactory," referring to the availability of clear, detailed guidelines specifying the acceptable use of assets in the institution. Such guidelines cover procurement practices to disposal policy. This highly rated response suggests that staff and faculty see the existence of well-defined and easily comprehensible policies that strictly guide asset use and management. Clear policies ensure consistency, accountability, and conformity with regulatory requirements throughout the institution (Abbott & Snidal, 2021). From the aggregate data collected from the heads, faculty, and staff for the Asset Management System of Higher Education Institutions (HEIs) for physical assets and facilities, certain important findings are made in terms of policy and strategy implementation.

Two of the items were rated the highest by the respondents, both with a weighted mean of 3.48 and tagged as "strongly agree/very satisfactory." The two items are having clear and complete guidelines on the allowable use of assets in the institution (Item 1) and established procedures on procuring new assets, stressing transparency, accountability, and strict compliance with budgetary limits (Item 3). High ratings here signal respondent agreement that HEIs have strong systems for managing asset use, procurement procedures, and financial management. Distinct instructions and organized procedures are essential to facilitate operational effectiveness, ensure compliance with laws and regulations, and maximize resource utilization across the institution (PURBA & Farah, 2021).

Table 2. Asset Management System for Physical Assets/Facilities in Terms of Data and Information Management

No.	**Data and Information Management**	Heads		Faculty	Combined and staff		
		W.m	V.D	W.m	V.D	W.m	V.D
1.	Establish a centralized data repository to store information about all institutional assets.	3.17	a/s	3.21	a/s	3.19	a/s
2.	There is a define standardized	3.20	a/s	3.24	a/s	3.22	a/s

	format and protocol for recording asset data to ensure consistency and compatibility across different departments and systems within the institution.						
3.	Maintain a comprehensive inventory of all institutional assets, including equipment, facilities, technology resources, intellectual property, and research materials.	**3.23**	**s.a/v.s**	**3.39**	**s.a/v.s**	**3.31**	**s.a/v.s**
4.	Implement processes for regularly updating and maintaining asset data to ensure accuracy and relevance over time.	3.13	a/s	3.22	a/s	3.18	a/s
5.	Implement robust data security measures to protect sensitive asset information from unauthorized access, disclosure, or tampering. This includes encryption, access controls, data back-ups, and compliance with relevant data protection regulations.	3.10	a/s	3.20	a/s	3.15	a/s
6.	Integrate asset data management processes with dedicated asset management systems or enterprise resource planning (ERP) platforms.	**2.97**	**a/s**	3.13	a/s	3.05	a/s
7.	Provide training and support to personnel responsible for managing asset data, including administrators, facilities staff, IT professionals, and researchers.	**2.97**	**a/s**	**3.09**	**a/s**	**3.03**	**a/s**
8.	Establish a data governance framework to define roles, responsibilities, and accountability for asset datamanagement within the institution.	3.03	a/s	3.10	a/s	3.07	a/s
9.	Leverage data analytics tools and reporting capabilities to gain	3.13	a/s	3.14	a/s	3.14	a/s

	insights into asset utilization, performance, and lifecycle management.						
10.	continuously monitor and evaluate The effectiveness of asset data management practices within the institution.	3.20	s.a/v.s	3.30	s.a/v.s	3.25	s.a/v.s
	Overall Weighted Mean	**3.11**	a/s	**3.20**	a/s	**3.16**	a/s

Legend: 3.25-4.00 strongly agree (s.a)/very satisfactory (v.s) 2.50-3.24 agree (a)/satisfactory (s) 1.75-2.49 moderately agree (m.a) 1.00-1.74 disagree (d)

Table 2. presents the practices of the private HEIs with their Asset Management System for physical assets/facilities in terms of data and information management. The overall weighted mean for the Asset Management System of private HEIs for physical assets/facilities in terms of data and information management is 3.11, 3.20, and 3.16, respectively, which is categorized as "agree/satisfactory." This indicates overall satisfaction with the system's performance; it also acknowledges potential areas for enhancement. Institutions may consider leveraging this baseline assessment to identify specific areas where improvements could further streamline asset management processes, enhance data accuracy, or improve the integration of information across departments.

Drawing from the information collected from heads of Higher Education Institutions (HEIs) about their Asset Management System for physical assets and facilities, with an eye towards data and information management, certain important findings and observations could be noted. The most highly rated item, 3, with a weighted mean of 3.23 and identified as "strongly agree/very satisfactory," maintains a complete inventory of all institutional assets. These include equipment, facilities, technology resources, intellectual property, and research material.

According to data collected from the faculty and staff members on the Asset Management System of Higher Education Institutions (HEIs) for physical assets and facilities and on data and information management, there are a number of important conclusions that can be derived from the results. The top-ranked item, 3, which was rated at 3.39 with the descriptor "strongly agree/very satisfactory," deals with having an extensive inventory of all institutional assets.

As indicated by the collective data compiled from heads, staff, and faculty, the highest rated is also item 3, with a weighted mean of 3.31 and termed "strongly agree/very satisfactory." This high rating indicates an agreement by faculty and staff regarding the significance of possession of accurate and current records of all assets in the institution. An exhaustive inventory is essential for accurate asset tracking, maintenance planning, budgeting, and compliance with regulatory requirements (Dinçkol, Ozcan & Zachariadis, 2023).

Table 3. Asset Management System for Physical Assets/Facilities in Terms of Performance Management

No.	**Performance Management**	Heads		Faculty and staff		Combined	
		W.m	V.D	W.m	V.D	W.m	V.D
1.	Have key performance indicators (KPIs) used to measure the effect-	**3.37**	**s.a/v.s**	3.29	s.a/v.s	3.33	s.a/v.s

	iveness of asset management practices.						
2.	Have a continuous improvement initiatives are implemented based on asset management performance evaluations.	3.17	a/s	3.24	a/s	3.21	a/s
3.	Have a regular audit or assess- 3.10 ments conducted to ensure compliance with asset management policies and procedures.		a/s	3.24	a/s	3.17	a/s
4.	Have an asset management performance metrics communicated effectively to relevant stakeholders within the institution.	3.17	a/s	3.21	a/s	3.19	a/s
5.	Actively seeks feedback from users and stakeholders to improve asset management practices.	**2.97**	**a/s**	3.17	a/s	**3.07**	**a/s**
6.	Have a process in place to address and rectify identified deficiencies or gaps in asset management performance.	3.13	a/s	**3.13**	**a/s**	3.13	a/s
7.	Have an asset management performance reports used to inform strategic decision-making within the institution.	3.33	s.a/v.s	**3.34**	**s.a/v.s**	**3.34**	**s.a/v.s**
8.	Actively benchmarks its asset 3.20 Management performance against industry standards or best practices.		a/s	3.23	a/s	3.22	a/s
9.	have an asset management performance evaluation conducted regularly and systematically.	3.17	a/s	3.27	a/s	3.22	a/s
10.	have the opportunities for training and development related to asset management performance improvement provided to relevant staff members	3.20	a/s	3.26	a/s	3.23	a/s
	Overall Weighted Mean	**3.18**	a/s	**3.24**	a/s	**3.21**	a/s

Legend: 3.25-4.00 strongly agree (s.a)/very satisfactory (v.s) 2.50-3.24 agree (a)/satisfactory (s) 1.75-2.49 moderately agree (m.a) 1.00-1.74 disagree (d)

Table 3 presents the practices of private HEIs with their Asset Management System for physical assets/facilities in terms of performance management. The overall weighted mean for the Asset Management System of private HEIs for physical assets/facilities in terms of performance management is 3.18, 3.24, and 3.21, respectively, which is categorized as "agree/satisfactory." Institutions may use this baseline assessment to identify opportunities to enhance performance monitoring processes, potentially by implementing more advanced monitoring technologies or refining performance indicators to better align with institutional goals and benchmarks. It also underscores the importance of ongoing evaluation and refinement to continuously enhance asset performance, optimize resource utilization, and support the institution's overall mission and objectives effectively.

The top-rated item for heads is Item 1, with a weighted mean of 3.37 and described as "strongly agree/very satisfactory," relating to having key performance indicators (KPIs) used to measure the effectiveness of asset management practices. This shows an overwhelming consensus among heads that HEIs use measurable parameters to assess the extent to which asset management practices are working. KPIs are important to enable objective evaluation, to realize areas for improvement, and to align asset management actions with institutional priorities and goals (Budihardjo et al., 2021). The most highly rated item by faculty and staff, with an average weighted response of 3.34 and characterized as "strongly agree/very satisfactory," is in relation to the utilization of asset management performance reports to guide strategic decision-making at the institution (Item 7).

This reflects a strong degree of consensus and favorable outlook in connection with the application of asset management performance reports in strategic decision-making among private Higher Education Institutions (HEIs). This rating implies that staff and faculty members assume that these reports are vital in influencing and shaping strategic decisions pertaining to asset management. For both heads and faculty and staff, item 7, with a weighted mean of 3.34 and "strongly agree/very satisfactory," is defined as asset management performance reports being utilized to guide decision-making at the institution.

This shows a high level of agreement among the respondents that HEIs use formal reports to measure asset management effectiveness. These formal reports become imperative in offering actionable information, highlighting trends, and aiding decision-making processes in resource planning and operations enhancement (Tortorella, 2019).

2. Asset Lifecycle Management Model (ALM) for Physical Assets/Facilities

Table 4. Asset Lifecycle Management Model (ALM) for Physical Assets/Facilities

No.	**ALM**	Heads		Faculty and staff		Combined	
		W.m	V.D	W.m	V.D	W.m	V.D
1.	Utilizes standardized methodologies or frameworks for assessing the lifecycle stages of assets (e.g., acquisition, utilization, maintenance, disposal).	**3.47**	**s.a/v.s**	**3.42**	**s.a/v.s**	**3.44**	**s.a/v.s**

2.	Have an established procedure for determining the optimal timing of asset replacement or disposal based on lifecycle considerations.	3.20	a/s	3.26	a/s	3.23	a/s	
3.	Incorporates sustainability principles into asset lifecycle management practices, such as promoting reuse, recycling, or refurbishment.	3.13	a/s	3.26	a/s	3.19	a/s	
4.	Asset lifecycle management plans within our institution consider the total cost of ownership, including acquisition, maintenance, and disposal costs.	3.10	a/s	3.18	a/s	3.14	a/s	
5.	Employs risk management techniques to mitigate potential risks associated with asset lifecycle decisions (e.g., technological obsolescence, market fluctuations).	3.00	a/s	**3.02**	**a/s**	3.01	a/s	
6.	Have a documented process for evaluating the performance and effectiveness of asset lifecycle management strategies within the institution.	3.07	a/s	3.19	a/s	3.13	a/s	
7.	Collaborates with external partners or vendors to optimize asset lifecycle management practices (e.g., through maintenance contracts, disposal services).	**2.93**	**a/s**	3.04	a/s	2.99	a/s	
8.	Asset lifecycle management decisions within the institution are based on comprehensive analyses of asset performance, condition, and future needs.	**2.93**	**a/s**	3.03	a/s	**2.98**	**a/s**	
9.	Asset lifecycle planning is Integrated into our institution's strategic planning processes.	3.00	a/s	3.12	a/s	3.06	a/s	

10.	Regularly assesses the condition of assets to inform lifecycle decisions.	3.23	a/s	3.14	a/s	3.19	a/s
	Overall Weighted Mean	**3.11**	**a/s**	**3.17**	**a/s**	**3.14**	**a/s**

Legend: 3.25-4.00 strongly agree (s.a)/very satisfactory (v.s) 2.50-3.24 agree (a)/satisfactory (s) 1.75-2.49 moderately agree (m.a) 1.00-1.74 disagree (d)

Table 4. outlines the Asset Lifecycle Management Model of private HEIs for physical assets/facilities. The overall weighted mean for the Asset Lifecycle Management Model of private HEIs for physical assets/facilities is 3.11, 3.17, and 3.14, respectively, which is categorized as "agree/satisfactory." It indicates that heads and faculty and staff perceive the Asset Lifecycle Management Model as effectively managing the lifecycle of physical assets—from acquisition or construction through maintenance, utilization, and eventual disposal or replacement. It suggests that the model is adequately structured to ensure assets are managed in a way that supports operational needs, regulatory compliance, and institutional objectives. Institutions may use this evaluation as a baseline to identify opportunities for enhancing asset lifecycle processes, such as implementing more efficient maintenance strategies, integrating sustainability considerations into asset management practices, or leveraging technology to streamline asset tracking and management (Al-Shaikhli, 2023).

The top-ranked item among heads, faculty and staff, and combined responses of heads and faculty with a weighted mean of 3.47, 3.42, and 3.44, labeled as "strongly agree/very satisfactory," refers to using standardized methodologies or frameworks for evaluating the asset lifecycle stages (Item 1). This reflects a high agreement between heads and faculty and staff that HEIs utilize structured methods to review asset lifecycles, from acquisition, utilization, and maintenance to disposal stages. Standardized methodologies give a systematic method of handling assets cost-effectively, maximizing the allocation of resources, and preventing non-compliance with regulatory standards (Yakubu & Bunyaminu, 2023).

Table 5. *Overall Tables for the Asset Management System Maturity Level and Asset Lifecycle Management Model*

	Heads		**Faculty and Staff**		**Combined**	
Indicators	O.W.M	V.D	O.W.M	V.D	O.W.M	V.D
Policy and strategy	3.35	S.A/V.S	3.42	S.A/V.S	**3.38**	S.A/V.S
Data and Information Management	3.11	A/S	3.20	A/S	**3.16**	A/S
Performance Management	3.18	A/S	3.24	A/S	**3.21**	A/S
Asset Lifecycle Management	3.11	A/S	3.17	A/S	**3.14**	A/S

Legend: 3.25-4.00 strongly agree (s.a)/very satisfactory (v.s) 2.50-3.24 agree (a)/satisfactory (s) 1.75-2.49 moderately agree (m.a) 1.00-1.74 disagree (d)

Table 5 presents the overall weighted mean of the asset management maturity model and the asset management lifecycle model in terms of policy and strategy with a combined weighted mean of 3.38 and is described as "strongly agree/very satisfactory." Stakeholders are highly satisfied with how policy and strategic frameworks are defined and implemented in asset management. Conversely, data and information management, performance management, and asset lifecycle management got a combined overall weighted mean of 3.16, 3.21, and 3.14, which is categorized as "agree/satisfactory." This suggests

that while stakeholders find data management, performance measurement, and asset lifecycle management satisfactory, there may be room for improvement or refinement in these areas to achieve higher levels of satisfaction and efficiency (Ferreira et al., 2020).

IV. CONCLUSIONS

The following conclusions are derived based on the findings of the study:

1. The Asset Management System in terms of Policy and Strategy is perceived as very satisfactory, highlighting the presence of clear, comprehensive, and well-implemented guidelines across private HEIs.

2. The Asset Management System in terms of Data and Information Management is rated satisfactory, indicating the need for improved data integration, training, and security despite generally effective asset inventory practices.

3. The Asset Management System, in terms of Performance Management is assessed as satisfactory, with structured performance reporting recognized as valuable for strategic decision-making, though continuous improvement processes could be strengthened.

4. The Asset Lifecycle Management Model is also deemed satisfactory, with strong adherence to standardized lifecycle assessment methods, yet opportunities remain for enhancing sustainability practices and strategic integration.

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