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The Effect of Biological Asset Management on the Financial Performance and Sustainability of Fisheries Companies in Samarinda, East Kalimantan, Indonesia

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Abstract: *This study aims to analyze the influence of Biological Asset Maintenance Management, Biological Asset Measurement and Valuation, Biological Inventory Control, and Biological Asset Development on the Financial Performance and Sustainability of companies in the fish and shrimp farming sector. The method used is a quantitative approach with Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis on data obtained from a large number of related respondents. The results of the study show that the four exogenous variables have a direct positive and significant influence on the company's financial performance, which then contributes significantly to the company's sustainability. In addition, several variables also show an indirect influence on sustainability through the mediation of financial performance. This study emphasizes that the integration of effective and efficient biological asset management is very important to create a balance between achieving financial goals and business sustainability. These findings are expected to serve as a basis for companies to optimize the management of biological assets and support sustainable business development strategies and increased competitiveness in the agricultural industry.*

Keywords*:* biological assets, biological asset measurement and valuation, biological inventory control, biological asset development, corporate financial performance.

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INTRODUCTION

The choice of the title of this research is based on the importance of understanding the factors that affect the financial performance and sustainability of companies in the biological asset-based industry, especially in the fish and shrimp farming sector. Business stability and sustainability are highly dependent on internal management, such as maintenance management, measurement and assessment methods, inventory control, and biological asset development. The achievement of a company's goals is not only measured by profitability, but also by its ability to maintain business continuity through sustainable and efficient management of biological resources. These factors are an important foundation in assessing the company's contribution to economic development oriented towards sustainability and community welfare (Rafiah *et al.*, 2022).

Biological Asset Maintenance Management (BAMM/X1) is a variable that describes

the extent to which a company maintains and maintains biological assets such as fish and shrimp. Good maintenance practices will maintain the health, quality, and productivity of biological assets, so that it has a direct impact on profitability and business sustainability. Maintenance includes aspects of feed, pond sanitation, disease control, and growth monitoring (Fitriasuri & Putri, 2022). Biological Asset Measurement and Valuation (BAMA/X2) includes the method used by companies to determine the fair value or recorded value of biological assets. Accurate measurement provides reliable financial information and becomes the basis for managerial decision-making. Proper valuation also affects reporting transparency and stakeholder trust, as well as has an impact on asset optimization in supporting financial performance and sustainability (Campos Llerena *et al.*, 2025). Biological Inventory Control (BPC/X3) is a control system for the stock, growth, and productivity of biological assets. Effective control ensures the availability of supply according to the production plan, avoids losses due to excess or shortage of inventory, and improves resource efficiency (Warsini *et al.*, 2024). With good control, the company can maintain income stability and maintain production sustainability. Biological Asset Development (BAD/X4) refers to the company's efforts to increase capacity or improve the quality of biological assets, both through investment in cultivation technology, research on superior varieties, and improvements in production facilities. This development plays a role in increasing output and product quality, optimizing profits, and strengthening competitiveness (Kartikasari *et al.*, 2021).

The Company's Financial Performance (CFP/Y1) is an initial outcome that describes the success of the business in generating profitability, ROI, or asset growth. Good financial performance indicates the effectiveness of biological asset management as well as the company's capacity to create economic value (Alfarisyi *et al.*, 2022).

Corporate Sustainability (CS/Y2) is a follow-up outcome that measures a company's ability to survive in the long term through business practices that are efficient, environmentally friendly, and oriented towards social welfare. Sustainability includes economic, environmental, and social aspects that support each other.

From this explanation, the formulation of the problem in this study is: 1. Does BAMM/X1 have a direct positive and significant effect on CFP/Y1? 2. Does BAMM/X1 have a direct positive and significant effect on CS/Y2? 3. Does BAMM/X1 have a direct positive and significant effect on CS/Y2 through CFP/Y1? 4. Does BAMA/X2 have a direct positive and significant effect on CFP/Y1? 5. Does BAMA/X2 have a direct positive and significant effect on CS/Y2? 6. Does BAMA/X2 have a direct positive and significant effect on CS/Y2 through CFP/Y1? 7. Does BPC/X3 have a direct positive and significant effect on CFP/Y1? 8. Does BPC/X3 have a direct positive and significant effect on CS/Y2? 9. Does BPC/X3 have a positive and significant indirect effect on CS/Y2 through CFP/Y1? 10. Does BAD/X4 have a direct positive and significant effect on CFP/Y1? 11. Does BAD/X4 have a direct positive and significant effect on CS/Y2? 12. Does BAD/X4 have a positive and significant indirect effect on CS/Y2 through CFP/Y1? 13. Does CFP/Y1 have a direct positive and significant effect on CS/Y2?

The urgency of this research lies in the need to strengthen effective and sustainable biological asset management practices. Empirical evidence on the influence of BAMM, BAMA,

BPC, and BAD on the financial performance and sustainability of companies will make a theoretical contribution to the accounting and biological asset management literature, as well as become the basis for business development policies and strategies in related sectors. The novelty of this research lies in the integration of biological asset management and control variables in the framework of business sustainability.

In practical terms, this research is expected to be able to provide recommendations for fish and shrimp farming companies to optimize the maintenance, assessment, control, and development of biological assets. The right strategy is expected to improve financial performance, strengthen long-term sustainability, increase market confidence, and expand contributions to an inclusive economy. Overall, the integration of BAMM, BAMA, BPC, and BAD is believed to be closely related to MPA and CS. If all variables are managed consistently, the company will be able to achieve a balance between financial achievement and business sustainability.

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Biological Asset Maintenance Management (BAMM/X1)

Biological Asset Maintenance Management describes the extent to which a company applies care and maintenance practices to biological assets such as fish and shrimp. Biological asset management theory asserts that systematic maintenance affects the productivity, quality, and sustainability of living assets. Companies that implement optimal maintenance management through feed control, environmental sanitation, disease control, and growth monitoring have greater potential to achieve good financial performance. In addition, sustainable maintenance practices support the company's long-term sustainability through resource efficiency and minimization of the risk of loss (Fitriasuri & Putri, 2022; Rafiah *et al.*, 2022; Utami & Prabaswara, 2020). Based on the above analysis, the hypothesis proposed is.

H1: **BAMM** /X1 has a direct positive and significant effect on CFP/Y1.

H2: **BAMM** /X1 has a direct positive and significant effect on CS/Y2.

H3: **BAMM** /X1 has a positive and significant indirect effect on CS/Y2 through CFP/Y1.

Biological Asset Measurement and Assessment (BAMA/X2)

Biological Asset Measurement and Valuation reflect the methods used by companies to determine the fair value or recorded value of biological assets. Based on the accounting theory of biological assets, accurate measurements provide reliable financial information and become the basis for sound managerial decision-making. Companies with a good valuation system can optimize resource allocation, increase reporting transparency, and strengthen stakeholder trust. Thus, BAMA is expected to have a positive influence on the company's financial performance and business sustainability (Campos Llerena *et al.*, 2025; Hamzah *et al.*, 2024; Warsini *et al.*, 2024). Based on the above analysis, the hypothesis proposed is.

H4: BAMA/X2 has a direct positive and significant effect on CFP/Y1.

H5: BMA/X2 has a direct positive and significant effect on CS/Y2.

H6: BAMA/X2 has a positive and significant indirect effect on CS/Y2 through CFP/Y1.

Biological Preparation ControPC/X3)

Biological Inventory Control is a control system for the stock, growth, and productivity of biological assets. Based on the theory of inventory management, effective

control ensures the availability of supply according to the production plan, avoids losses due to excess or underinventory, and increases operational efficiency. Companies with a good inventory control system can maintain production stability, optimize cash flow, and reduce operational risks. This has a positive impact on achieving financial performance and supporting long-term business sustainability (Gatot *et al.*, 2022; Suhardjo *et al.*, 2024; Utami & Prabaswara, 2020). Based on the above analysis, the hypothesis proposed is.

H7: BPC/X3 has a direct positive and significant effect on CFP/Y1.

H8: BPC/X3 has a direct positive and significant effect on CS/Y2.

H9: BPC/X3 has a positive and significant indirect effect on CS/Y2 through CFP/Y1.

Biological Asset Development (BAD/X4)

Biological Asset Development measures a company's efforts to increase capacity or improve the quality of biological assets through technology investment, research of superior varieties, and improvements in production facilities. Based on investment and development theory, companies that consistently develop assets have a competitive advantage in improving output, product quality, and production efficiency. Targeted development investments contribute to increasing profitability, asset growth, and company competitiveness, as well as supporting sustainability through innovation and adaptation to market changes (Detra *et al.*, 2025; Kartikasari *et al.*, 2021; Utami & Prabaswara, 2020). Based on the above analysis, the hypothesis proposed is.

H10: BAD/X4 has a direct positive and significant effect on CFP/Y1.

H11: BAD/X4 has a direct positive and significant effect on CS/Y2.

H12: BAD/X4 has a positive and significant indirect effect on CS/Y2 through CFP/Y1.

Corporate Financial Performance (CFP/Y1) and Corporate Sustainability (CS/Y2)

A company's financial performance is a reflection of the company's success in generating profitability, ROI, and asset growth through effective management of biological assets. Companies that achieve optimal financial performance demonstrate management's ability to create economic value and optimize resources. When financial performance is achieved well, the company's sustainability will also increase because the company has the financial capacity to invest in sustainable practices, technological innovation, and social responsibility. Thus, MPA has an important role in strengthening CS and maintaining long-term business continuity (Alfarisyi *et al.*, 2022). Based on the above analysis, the hypothesis proposed is.

H13: CFP/Y1 has a direct positive and significant effect on CS/Y2.

RESEARCH METHODOLOGY

The quantitative design used in this study is the Partial Least Squares Model (PLS). PLS-SEM is widely used in the fields of economics, sociology, and other disciplines (Risher, 2018). A population is a collection of individuals, objects, or elements that share the same or relevant characteristics and are the subject of research or statistical analysis (Rafdinal & Senalasari, 2021). This is a broad group and represents the entire group that the findings of this study want to study or generalize. In many cases, the population can be very large, such as all residents of a country or all of a company's customers (Rafdinal & Senalasari, 2021). However, sometimes populations can be more limited, such as all products produced in the

past month. Taking data from an entire population is often impractical or expensive (Hair) *et al.*, 2017). Therefore, we often use samples to draw conclusions about the population. In total, 532 respondents who filled out the questionnaire were local government employees. A sample is a subset or part taken from a larger population (Hair) *et al.*, 2019). These samples must be carefully selected to represent the characteristics of the population well. Sampling is a method used to reduce the complexity of analysis and research costs (Yee1, Angeline Yap Kiew Heong and Wong Siew Chin, 2020). It is important to note that the quality of the results from the sample analysis is highly dependent on the sampling method used and the extent to which the sample represents the actual population (Sigh) *et al.*, 2021). In statistical analysis, many statistical techniques are used to investigate and make inferences about the population based on data from the sample (Imam Ghozali, 2005). This includes estimating population parameters, hypothesis tests, and other statistical analyses that help us understand and make decisions about the characteristics of larger populations based on the sample data we have (Hasiara & Ahyar M.Diah, 2023).

Quantitative data collection techniques

Data collection in this study was carried out through responses from respondents who filled out questionnaires that had been distributed to each Regional Apparatus Organization (OPD). The questionnaire was compiled based on the Likert scale with four alternative answers, namely strongly agree with a score of 4, agree with a score of 3, disagree with a score of 2, and strongly disagree with a score of 1. The giving of this score adapts opinions Rachmad *et al.* (2024), which explains that the perception of the apparatus can be measured using the level of approval of the statements submitted in the research questionnaire. Thus, this research instrument is designed to obtain a clear picture of the application *Artificial Intelligence*, digital accounting systems, the reliability of error detection, and its impact on the timeliness of audits and the quality of audit results of financial statements.

The sampling techniques used in this study are *purposive sampling*. *Purposive sampling* This study was chosen because this study requires respondents with certain criteria so that the data obtained is more relevant to the research variables. This technique is considered effective for producing a sample that can be generalized, as long as the criteria used are in accordance with the intended population (Hasiara, 2018). According to Hasiara (2018), research with the right sampling method will be able to repressubgroups in the population, so that the results of the research can be scientifically accounted for. This is in line with Subhaktiyasa (2024) which emphasizes that the quality of the data is greatly influenced by the suitability of the sampling method with the characteristics of the study population.

The criteria for respondents in this study are local government officials with a minimum level of education of Diploma IV or Bachelor's. Of the total respondents, there were 380 people with a Diploma IV education background, 358 people with Bachelor's education (S1), and 7 people with Master's education, making a total of 745 respondents. In addition to educational qualifications, this study also considered the respondents' work experience in the fields of accounting, finance, and auditing. There were 67 respondents with more than 25 years of experience, 228 people had experience between 15 to 20 years, and the remaining 450 people had experience between 5 to 15 years.

RESULTS AND DISCUSSION

The results of empirical and theoretical research that have been written in a systematic, analytical, and informative manner through model diagrams in the study can be well understood. To provide adequate understanding, the author presents a measurement model that can explain each variable in this study. Furthermore, the author presents information about the quality of respondents which can be seen in Table 1.

Table 1. Number of Respondents by Last Education

Last Education	Numbers of Respondents	Presentation
Diploma 4	380	51%
Bachelor's degree	358	48%
Postgraduate (S2)	7	1%
Total	745	100%

Source: Primary data processed, 2025

Based on Table 1, it is known that the number of respondents who have the last education of Diploma 4 is 380 people or 51%, respondents with a bachelor's degree are 358 people or 48%, while respondents with postgraduate education are 7 people or 1%. Furthermore, the author presents the number of respondents based on their experience in company management, which can be seen in Table 2.

Table 2. Number of Respondents by Management Experience

Management Experience	Numbers of Respondents	Presentation
Above 25 Years	67	9%
15 years to 20 years	201	27%
5 years to 20 years	477	64%
Total	745	100%

Source: Primary data processed, 2025

Based on Table 2, it is known that the number of respondents with more than 25 years of management experience is 67 people or 9%, those with experience between 15 to 20 years are 201 people or 27%, and respondents with experience between 5 to 15 years are 477 people or 64%. Furthermore, the results of the final test using *Smart Partial Least Squares* (WarpPLS Version 7.0) are presented in the form of a diagram of the final research model which can be seen in Figure 2. This diagram shows the direct and indirect relationship between exogenous and endogenous variables, and strengthens the interpretation of the research results based on respondent data.

Variable Test Analysis

Variable test analysis in the context of the Partial Least Squares (PLS) method is part of the measurement model evaluation process that aims to test the relationship between latent variables (constructs that are not directly observed) and observable variables (variables that are directly observed). PLS is one of the path analysis techniques commonly used in quantitative research, especially in structural data analysis. In PLS analysis, the evaluation stage of the measurement model involves several steps, including Variable Test

Analysis, which includes: 1) Testing the validity of the data used to check the extent to which the measurement variable or indicator is reliable in measuring an existing latent variable. This is often done by testing whether the measurement variable has a significant correlation with the latent variable being measured.2) Reliability testing is used to measure the extent to which measurement variables are consistent in measuring the same latent variable over time. This is often done by calculating a reliability coefficient such as Cronbach's alpha. This can be seen in Table 4.

Data validity testing is the process of evaluating the extent to which the data collected is in accordance with the purpose of the research or its use. Data validity refers to the accuracy and reliability of the information obtained from the data source. It involves assessing whether the data adequately reflects the concept or phenomenon to be measured. The data validity test is essential to ensure that the conclusions or findings resulting from data analysis are trustworthy and relevant to the research question being asked.

Evaluation of Outer Model Testing

Based on the structural model test using the PLS method, the external structural model will be tested with indicators consisting of latent variables. This test is carried out to determine the level of validity of the indicator against the latent variable. Evaluation of the measurement model in quantitative research is the process of evaluating the suitability and quality of the model used to measure the construct or variables observed. Testing the measurement model actually measures the construct in question by examining the relationship between the measurement variable and other variables related to the construct. The goodness of fit test is evaluating how well the measurement model matches the observed data, using statistics such as Chi-square, RMSEA, CFI, and TLI.

Outer Model and *Inner Model*. This section deals with the measurement of observed variables or constructs. This includes all latent variables (constructs that are not directly observed) and observable variables (variables that are observed directly). At this stage, the researcher examines the fit between the empirical data observed and the model proposed to measure the latent variables. The evaluation is carried out through an analysis of the reliability and validity of the constructs.

Table 3. Results of Reflective Model Outer Testing.

Variables	Indicators	Loading Factor	Cronbach Alpha	Composite Reliability	AVE
Biological Asset Maintenance Management (**BAMM** /X1)	BAMM /X11	0.834	0.883	0.915	0.684
	BAMM /X12	0.882			
	BAMM /X13	0.848			
	BAMM /X14	0.855			
	BAMM /X15	0.706			
Biological Asset Measurement and Assessment	BAMA	0.836	0.892	0.921	0.699

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(BAMA/X2)	/X21				
	BAMA /X22	0.827			
	BAMA /X23	0.858			
	BAMA /X24	0.849			
	BAMA /X25	0.810			
	BPC/X31	0.767			
	BPC /X32	0.841			
Biological Preparation Control (BPC/X3)	BPC /X33	0.865	0.882	0.914	0.680
	BPC /X34	0.852			
	BPC /X35	0.794			
	BAD/X41	0.762			
	BAD /X42	0.831			
Biological Asset Development (BAD/X4)	BAD /X43	0.884	0.891	0.920	0.697
	BAD /X44	0.877			
	BAD /X45	0.815			
	CFP/Y11	0.737			
	CFP /Y12	0.827			
Corporate Financial Performance (CFP/Y1)	CFP /Y13	0.854	0.861	0.900	0.644
	CFP /Y14	0.830			
	CFP /Y15	0.758			
	CS/Y21	0.845			
	CS/Y22	0.892			
Corporate Sustainability (CS/Y2)	CS/Y23	0.907	0.923	0.942	0.765
	CS/Y24	0.881			
	CS/Y25	0.847			

Source: PLS Version 8.0 output results (2025)

Based on the results of data processing, the Composite Reliability (CR) value on all research variables showed excellent and consistent results, where all CR values were above the minimum threshold of 0.6 required for construct reliability. The CR values of each variable were: Biological Asset Maintenance Management (BAMM/X1) = 0.915, Biological Asset Measurement and Valuation (BAMA/X2) = 0.921, Biological Inventory Control (BPC/X3) = 0.914, Biological Asset Development (BAD/X4) = 0.920, Company Financial Performance (CFP/Y1) = 0.900, and Company Sustainability (CS/Y2) = 0.942. All of these CR results prove that the measurement tools used in the study have high internal consistency (Yee1 & Angeline Yap Kiew Heong, and Wong Siew Chin, 2020).

Meanwhile, the results of the test on convergent validity using Average Variance Extracted (AVE) also showed values above the minimum validity limit of 0.5 for all constructs in the model. The AVE values recorded were BAMM/X1 = 0.684, BAMA/X2 = 0.699, BPC/X3 = 0.680, BAD/X4 = 0.697, CFP/Y1 = 0.644, and CSY2 = 0.765. These results prove that the indicators that make up each latent variable are able to represent the variable effectively and meet the convergent validity criteria (Rafdinal & Senalasari, 2021).

In terms of indicator validity, the results of testing with loading factors showed that all indicators had values above 0.7, except for some indicators that were close to the

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minimum limit of 0.7. For example, in the Biological Asset Maintenance Management variable, the BAMM/X15 (0.706) indicator was still acceptable even though the contribution was relatively lower compared to BAMM/X12 (0.882) and BAMM/X13 (0.848) which were very strong. Similarly, in the Biological Asset Development variable, the BAD/X41 (0.762) and BAD/X45 (0.815) indicators were still consistent, while BAD/X43 (0.877) showed the highest contribution. Furthermore, the BAMA, BPC, CFP, and CS variables showed indicators with an average loading factor value above 0.80, thus reflecting solid construct strength (Rafdinal & Senalasari, 2021).

The results of internal reliability testing with Cronbach Alpha also confirmed the consistency of the research instruments, where all Cronbach Alpha values were above the threshold of 0.6. The Cronbach Alpha values were recorded as BAMM/X1 = 0.883, BAMA/X2 = 0.892, BPC/X3 = 0.882, BAD/X4 = 0.891, CFP/Y1 = 0.861, and CS/Y2 = 0.923. This confirms that all research instruments are suitable for use because they have high reliability despite variations between variables.

Overall, the validity and reliability testing in this study showed that all variables, namely Biological Asset Maintenance Management, Biological Asset Measurement and Assessment, Biological Inventory Control, Biological Asset Development, Company Financial Performance, and Corporate Sustainability, have met the criteria required in quantitative research. Thus, all constructs can be declared valid and reliable, and can be continued at the structural model evaluation stage which includes testing fit models, path coefficients, and R^2 to assess the suitability and reliability of research models based on empirical data.

Table 4.Inner Model Test Results

Remarks	Results	*P-values*	Criteria	Status
APC	0.150	<0.001	P < 0.001	Fit
ARS	0.244	<0.001	P < 0.001	Fit
AARS	0.240	<0.001	P < 0.001	Fit
AVIF	1.445	-	*Acceptable if* <= 5, *Ideally* <= 3.3	Fit
AFVIF	1.470	-	*Acceptable if* <= 5, *Ideally* <= 3.3	Fit
GoF	0.412	-	*Small* >= 0.1, *Medium* >= 0.25, *Large* >= 0.36	Fit
SPR	1.000	-	*Acceptable if* >= 0.7, *Ideally* = 1	Fit
RSCR	1.000	-	*Acceptable if* >= 0.9, *Ideally* = 1	Fit
SSR	1.000	-	*Acceptable if* >= 0.7	Fit
NLBCDR	1.000	-	*Acceptable if* >= 0.7	Fit

Source: WarpPLS Version .7.0 (2025) output results

Evaluation of the feasibility of structural models is a crucial stage in the analysis of SEM-PLS, especially when using WarpPLS software. This step aims to ensure that the developed model not only shows significant causal relationships between variables, but is also BAD of comprehensively representing research phenomena with adequate validity and reliability.

The results of the analysis show that several model feasibility indices can be explained as follows. First, the Average Path Coefficient (APC) value of 0.150 with a p-value < 0.001 indicates that the average path coefficient between latent variables in the model is

statistically significant at a high confidence level. This proves that the relationship path construction in the model has a real theoretical relevance and is supported by empirical data, not just a result of chance. Second, the Average R-squared (ARS) of 0.244 and the Average Adjusted R-squared (AARS) of 0.240, both with a p-value of < 0.001, indicate that the independent variables in the model are on average able to explain about 24% of the variability of dependent variables. Although this figure is not very high, it is adequate in social science studies that are generally faced with various external factors beyond the control of the model. Adjustments to AARS play a role in correcting potential bias due to the number of variables in the model so that the validity of the explanation is maintained.

Furthermore, the multicollinearity test through the Average Variance Inflation Factor (AVIF) value of 1.445 and the Average Full Collinearity VIF (AFVIF) of 1.470, all of which are well below the maximum threshold of 5 and close to the ideal criterion ≤ 3.3, confirm that there is no problem of multicollinearity. This means that each independent construct can make a distinctive contribution in explaining other variables. The results of the Goodness of Fit (GoF) assessment of 0.412 which exceeded the threshold of the large category prove that the model has a solid balance between measurement validity (outer model) and structural validity (inner model). In other words, the quality of the indicators in the construct as well as the strength of latent interconstruct relationships in the model have been well maintained.

Furthermore, the results of structural reliability testing were also very strong. Simpson's Paradox Ratio (SPR), R-squared Contribution Ratio (RSCR), Statistical Suppression Ratio (SSR), and Nonlinear Bivariate Causality Direction Ratio (NLBCDR), each with a value of 1,000 (for SPR, RSCR, SSR, NLBCDR) and conformed to the applicable minimum eligibility standards. This means that the model is free from Simpson's Paradox symptoms, the predictor's contribution to dependent variables is very consistent, there is no suppression effect, and the direction of nonlinear causality is in accordance with the developed model framework. In general, all evaluation indicators ranging from path significance, model explanatory ability, multicollinearity issues, global feasibility, to structural consistency indicate that the structural model of this study is very feasible to use. The model can not only be used as the basis for hypothesis testing, but also has a high level of reliability in representing empirical phenomena. Thus, the research model used is proven to be valid, reliable, and feasible for use in follow-up studies. This level of feasibility strengthens the researcher's theoretical arguments and ensures that the research results have a solid methodological foundation and can be accounted for academically.

Modeling Analysis and Hypothesis Testing

The results of this examination reveal the direction of the relationship between independent variables and dependent variables using path analysis. The results of the research can be rejected or accepted based on the significance value. The significance value in this research is 5%. The results of the test related to the hypothesis of direct influence and indirect influence can be seen in Table 5.

Table 5. Results Hypothesis testing both direct and indirect influences.

Hypothesis	Coeff.	p-value	Conclusion
H1: Biological Asset Maintenance Management (BAMM/X1) has a direct	0,123	<0.001	Accepted

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positive and significant effect on the Company's Financial Performance (CFP/Y1).			
H2: Biological Asset Maintenance Management (BAMM/X1) has a direct positive and significant effect on the Company's Sustainability (CS/Y2).	0,158	<0.001	Accepted
H3: Biological Asset Maintenance Management (BAMM/X1) has a positive and significant indirect effect on the Company's Sustainability (CS/Y2) through the Company's Financial Performance (CFP/Y1).	0,029	0,090	Rejected
H4: Measurement and Valuation of Biological Assets (BAMA/X2) has a direct positive and significant effect on the Company's Financial Performance (CFP/Y1).	0,201	<0.001	Accepted
H5: Biological Asset Measurement and Valuation (BAMA/X2) has a direct positive and significant effect on the Company's Sustainability (CS/Y2).	0,170	<0.001	Accepted
H6: Biological Asset Measurement and Valuation (BAMA/X2) has a positive and significant indirect effect on Company Sustainability (CS/Y2) through the Company's Financial Performance (CFP/Y1).	0,048	0.033	Accepted
H7: Biological Inventory Control (BPC/X3) has a direct positive and significant effect on the Company's Financial Performance (CFP/Y1).	0,071	0.025	Accepted
H8: Biological Inventory Control (BPC/X3) has a direct positive and significant effect on Company Sustainability (CS/Y2).	0,142	<0.001	Accepted
H9: Biological Inventory Control (BPC/X3) has a positive and significant indirect effect on Company Sustainability (CS/Y2) through the Company's Financial Performance (CFP/Y1).	0,017	0,179	Rejected
H10: Biological Asset Development (BAD/X4) has a direct positive and significant effect on the Company's Financial Performance (CFP/Y1).	0,059	0.053	Accepted
H11: Biological Asset Development (BAD/X4) has a direct positive and significant effect on the Company's Sustainability (CS/Y2).	0,193	<0.001	Accepted
H12: Biological Asset Development (BAD/X4) has a positive and significant indirect effect on Corporate Sustainability (CS/Y2) through Corporate Financial Performance (CFP/Y1).	0,014	<0.001	Accepted
H13: The Company's Financial Performance (CFP/Y1) has a direct positive and significant effect on the Company's Sustainability (CS/Y2).	0,236	<0.001	Accepted

Source : Output PLS Version 7.0 (2025)

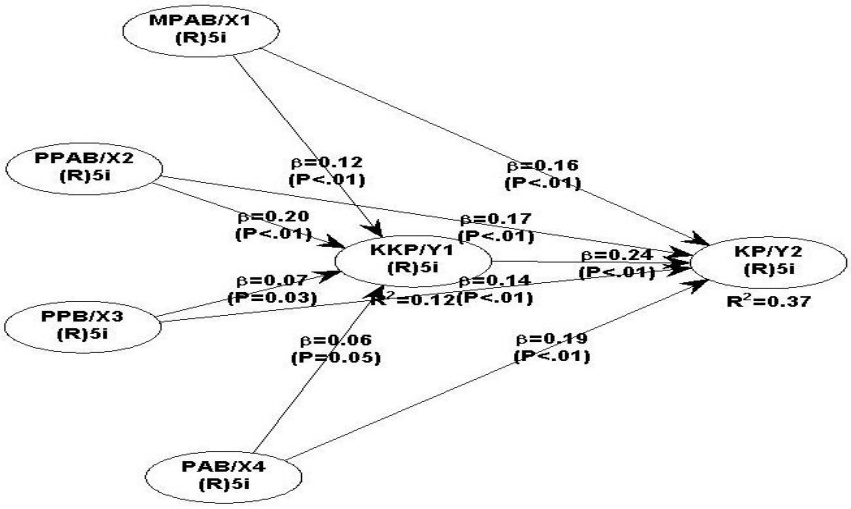


Figure 1. *Conceptual model of the final research*

Discussion of Research Findings

H1 shows that Biological Asset Maintenance Management (BAMM/X1) has a positive and significant direct influence on the Company's Financial Performance (CFP/Y1), with a coefficient of 0.123 and a p value of less than 0.001. This indicates that good maintenance practices greatly determine the company's ability to optimally manage biological assets so as to support the achievement of strong financial performance. Companies that consistently implement care procedures such as proper feed management, environmental health of the farm, disease control, and growth monitoring will be able to increase productivity and quality of cultivation yields (Utami & Prabaswara, 2020). This increase in productivity directly contributes to the company's revenue and profitability, which is the main benchmark in assessing the company's operational success. Therefore, effective maintenance management not only supports the physical aspects of biological assets, but also significantly affects the financial aspects, making it an essential factor in realizing sustainable and stable business growth in the aquaculture sector.

Furthermore, H2 proves that Biological Asset Maintenance Management (BAMM/X1) also has a positive and significant direct impact on Corporate Sustainability (CS/Y2), with a coefficient of 0.158 and a p-value of less than 0.001. This illustrates that the implementation of good maintenance management not only affects the financial aspect, but also strengthens the company's resilience to survive in the long term. Sustainable maintenance of biological assets includes efforts to maintain the balance of the ecosystem and the quality of the production environment which in turn supports production continuity without causing resource degradation. In this way, companies are able to fulfill social and environmental responsibilities that are an integral part of the modern concept of sustainability. In addition, good maintenance practices also increase the trust of stakeholders, such as customers, business partners, and regulators, all of which play a role in strengthening the company's market position and reputation, so that business sustainability can be achieved more effectively (Fitriasuri & Putri, 2022).

H3 tested the indirect influence of Biological Asset Maintenance Management (BAMM/X1) on Company Sustainability (CS/Y2) through the mediation of the Company's Financial Performance (CFP/Y1). The results showed a positive relationship with a coefficient of 0.029 and a p-value of 0.090 indicating moderate significance, reinforcing the existence of a mediation pathway where good management of biological assets also encourages improved financial performance, which in turn supports the company's sustainability. In other words, effective maintenance management not only has a direct impact on business continuity, but also through increased financial results that allow the company to allocate more resources to other sustainable practices. This mediation model emphasizes the importance of a holistic approach in managing biological resources, where strengthening financial aspects is a pillar for realizing sustainability goals in aquaculture companies, so that business continuity does not only rely on operational aspects alone, but also on economic forces that support long-term investment (Rafiah *et al.*, 2022).

Then, H4 shows that the Biological Asset Measurement and Valuation (BAMA/X2) has a positive and significant direct effect on the Company's Financial Performance (CFP/Y1),

with a coefficient of 0.201 and p<0.001. The right valuation method is crucial in providing an accurate picture of asset value, so that management can make more effective and rational decisions in business management. A realistic valuation of the fair value or recorded value of biological assets provides a solid basis for working capital management, investment planning, and financial risk control (Hamzah *et al.*, 2024). This has a direct impact on the company's ability to optimally allocate resources and maximize potential profits. In addition, proper measurement also supports the transparency of financial statements, which is important in increasing investor and business partner confidence, so that the company can operate with high credibility in a competitive market.

H5 confirms the positive direct influence of Biological Asset Measurement and Valuation (BAMA/X2) on Company Sustainability (CS/Y2), with a coefficient of 0.170 and p-value < 0.001. Accurate and transparent asset valuation plays a crucial role in supporting sustainability-oriented strategic decision-making. Proper value measurement enables companies to manage risks related to market fluctuations and environmental changes, while ensuring that investments and development of biological assets are carried out with consideration of real value and long-term profit potential (Warsini *et al.*, 2024). This strengthens the company's position in meeting increasingly stringent sustainability standards and increases the company's resilience to external challenges, such as climate change and environmental regulations. Therefore, measurement and valuation function not only as an accounting tool, but also as a strategic management instrument to ensure the company's operational continuity and growth.

The results of the mediation on H6 showed that Corporate Financial Performance (CFP/Y1) mediated the relationship between the Measurement and Valuation of Biological Assets (BAMA/X2) and Corporate Sustainability (CS/Y2), with a coefficient of 0.048 and a significance level of p=0.033. These findings confirm that good management of biological asset values can improve the company's financial performance, which in turn strengthens the sustainability aspect of the business. This synergy indicates that the financial aspect is an important bridge in realizing sustainable business practices, where strong financial results allow investment in green technology, product quality improvement, and corporate social responsibility. This provides an understanding that sustainability does not stand alone, but is the result of the integration of technical asset management and financial results as an indication of the company's long-term health and strength (Campos Llerena *et al.*, 2025).

H7 shows that Biological Inventory Control (BPC/X3) has a direct positive and significant influence on the Company's Financial Performance (CFP/Y1), with a coefficient of 0.071 and p=0.025. An effective control system over the stock, growth, and productivity of biological assets plays a vital role in maintaining production continuity and optimizing supply chain efficiency. With good inventory control, companies can minimize the risk of excess or understock, which often leads to financial losses and operational disruptions. Organized inventory management allows companies to maintain product quality, meet market demand on time, and maintain cash flow stability which contributes greatly to financial performance. Therefore, inventory control is a crucial aspect in biological asset management that connects technical aspects with financial results directly (Suhardjo *et al.*, 2024).

H8 shows that Biological Inventory Control (BPC/X3) also has a direct positive and significant effect on Company Sustainability (CS/Y2), with a coefficient of 0.142 and p < 0.001. Sustainable inventory management ensures a balance between the growth of biological assets and production needs, so that the company can survive and thrive in the long term. Good control also encourages environmentally friendly and efficient cultivation practices in the use of resources, in line with sustainability principles that prioritize conservation and social responsibility. This stock control strategy that is adaptive to changing demand and environmental conditions strengthens the company's resilience to external shocks and increases the trust of business partners and consumers (Gatot *et al.*, 2022).

H9, which examined the indirect influence of BPC on CS through MPAs, showed insignificant results (coefficient 0.017; p=0.179). Although inventory control contributes to performance and sustainability, its direct influence is more dominant than the mediating pathway of financial performance. These findings imply the complexity of the relationship between inventory management and sustainability and indicate the need for further studies to clarify the mediation mechanisms that occur in the operational context of aquaculture companies (Utami & Prabaswara, 2020).

H10 proves that Biological Asset Development (BAD/X4) has a positive and significant influence on the Company's Financial Performance (CFP/Y1), with a coefficient of 0.059 and p=0.053. Sustainable investment in improving the quantity and quality of biological assets in the form of cultivation technology, research on superior varieties, and cutting-edge production facilities can increase production volume and product selling value, which directly contributes to the company's revenue growth and profitability. In addition, asset development also opens up opportunities for product innovation and business diversification that can reduce business risks (Detra *et al.*, 2025). Thus, the development of biological assets is not only a driver of financial growth, but also the key to maintaining the company's competitiveness in the face of market dynamics and increasingly high consumer demands.

H11 shows that Biological Asset Development (BAD/X4) also has a direct positive and significant effect on Corporate Sustainability (CS/Y2), with coefficients of 0.193 and p<0.001. The commitment to sustainable investment in biological asset development shows the company's strong long-term orientation, including the adoption of environmentally friendly technologies and responsible management of natural resources. This supports business practices that are not only economically profitable, but also aligned with the social and ecological values that are the main requirements for sustainability in modern industries. These development efforts strengthen the company's foundation in the face of increasingly complex environmental and social risks and enhance the company's reputation as a pioneer in sustainability-based businesses (Kartikasari *et al.*, 2021).

H12 shows the positive indirect influence of Biological Asset Development (BAD/X4) on Corporate Sustainability (CS/Y2) through the mediation of Corporate Financial Performance (CFP/Y1) with coefficients of 0.014 and p<0.001, which shows that investment in biological asset development improves company sustainability through improved financial performance. (Utami & Prabaswara, 2020) These findings emphasize the

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importance of a synergistic relationship between asset development and balanced financial outcomes as the foundation of business sustainability. Good financial performance gives companies room to invest further in innovation and environmentally friendly practices, thus maintaining a balance between economic and ecological goals.

Finally, H13 emphasizes that the Company's Financial Performance (CFP/Y1) has a direct positive and significant effect on the Company's Sustainability (CS/Y2), with a coefficient of 0.236 and $p<0.001$. This means that the better the financial performance of a company in managing biological assets, the higher the level of sustainability achieved. Strong financial performance reflects the company's efficiency, profitability, and capacity to make sustainable investments, all of which are crucial elements in maintaining operational continuity and competitiveness in the market. In addition, optimal financial performance makes it easier for companies to adopt environmentally friendly practices, expand social responsibility programs, and build a positive reputation that strengthens relationships with consumers, stakeholders, and regulators. Thus, financial performance is the main indicator of a company's readiness to carry out sustainable business practices comprehensively and responsibly (Alfarisyi *et al.*, 2022).

CONCLUSION

The conclusion of this study shows that exogenous variables consisting of Biological Asset Maintenance Management (BAMM/X1), Biological Asset Measurement and Assessment (BAMA/X2), Biological Inventory Control (BPC/X3), and Biological Asset Development (BAD/X4) have a direct positive and significant influence on the Company's Financial Performance (CFP/Y1). These findings confirm that the technical and managerial management of biological assets greatly determines the company's ability to create optimal financial results. Companies that successfully manage biological assets tend to achieve high efficiency, maximum productivity, and strong financial performance, all of which are determining factors for the success of the cultivation business in the long term. Furthermore, these variables also have a direct positive and significant influence on Company Sustainability (CS/Y2). This implies that effective management of biological assets not only impacts financial results, but also strengthens business resilience and sustainability. Companies that are able to manage biological assets sustainably by maintaining the quality and production environment will be better able to withstand external challenges and meet increasing social and ecological demands. Therefore, the integration between technical asset management and the achievement of sustainability is key to operational success and corporate reputation. The indirect influence of exogenous variables on the Company's Sustainability through the mediation of the Company's Financial Performance shows significant results only in the Measurement and Valuation of Biological Assets (BAMA/X2) and the Development of Biological Assets (BAD/X4). This means that companies that excel in asset value assessment and investment in the development of biological assets are able to strengthen their business sustainability through the achievement of good financial performance. Meanwhile, the indirect impact of Biological Asset Maintenance Management (BAMM/X1) and Biological Inventory Control (BPC/X3) through financial performance on sustainability is not so significant, indicating that the direct effect of operational management

is more dominant on business sustainability.

Finally, the Company's Financial Performance has been proven to have a positive and significant direct influence on Corporate Sustainability (CS/Y2). This confirms that the achievement of good financial results is the main foundation for companies in carrying out sustainable business practices, increasing competitiveness, and building stakeholder trust. Strong financial performance opens up space for companies to invest further in innovation, environmental management, and social responsibility, thereby strengthening its position as a sustainable business actor and contributing to an inclusive and equitable economic system. These findings provide an important empirical basis for policy-making, strategic planning, and business development in the biological asset-based aquaculture sector.

LIMITATIONS OF THE STUDY AND AREAS FOR FURTHER RESEARCH

This study is limited to the East Kalimantan Province, Indonesia, and the results of this study can be generalized to developed and developing countries. This study is very limited by the time it was conducted from 2020 to 2024. And the sample size in the study is in the medium category because the number of respondents who filled out the questionnaire was 745 respondents. This study uses a quantitative method and uses the Partial Least Squares Structural Equation Modeling (PLS-SEM, version 7.0) model.

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