COMPARATIVE ECONOMIC ASSESSMENT OF POND-BASED AND CAGE-BASED AQUACULTURE ENTERPRISES IN MALAWI

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INTRODUCTION

In Malawi, fish provides over 70% of animal protein intake, and aquaculture has grown rapidly from 3,700 tonnes (2013) to over 12,000 tonnes (2024). Pond systems dominate smallholder production, but less productive than cage systems, which offer higher yields although require greater investment. There is limited evidence comparing their economic performance in Malawi, highlighting the need for this study.

OBJECTIVES

1. To evaluate production efficiency in pond-based and cage-based aquaculture enterprises across scales.
2. To assess the profitability of pond-based and cage-based aquaculture enterprises across scales.

METHODOLOGY

The study used data from a purposive sample of pond and cage aquaculture farms. Production efficiency was assessed using cost per kg, gross margin per kg, and the cost shares of feed and seed.

Profitability over a 10-year horizon was evaluated using Net Present Value (NPV), Internal Rate of Return (IRR), and payback period through discounted cash flow methods. These indicators were used to assess long-term financial viability, investment returns, and the time required to recover initial investment costs.

RESULTS

Table 1: *Production efficiency indicators for different aquaculture systems*

Production Efficiency Indicators	Production System Indicators			
	Small-scale pond based	Small-scale cage based	Large-scale pond based	Large-scale cage based
Total harvest (kg)	560.5	2200	6018	15000
Feed %	71	41	83	73
Seed %	22	15	9	7
Total cost/kg	7,832	6,910	8,666	8,170
Gross margin/kg	4,168	7,090	3,334	5,830

- Cage systems had lower cost per kg than pond systems, indicating higher efficiency.
- Feed was the dominant cost across all systems.

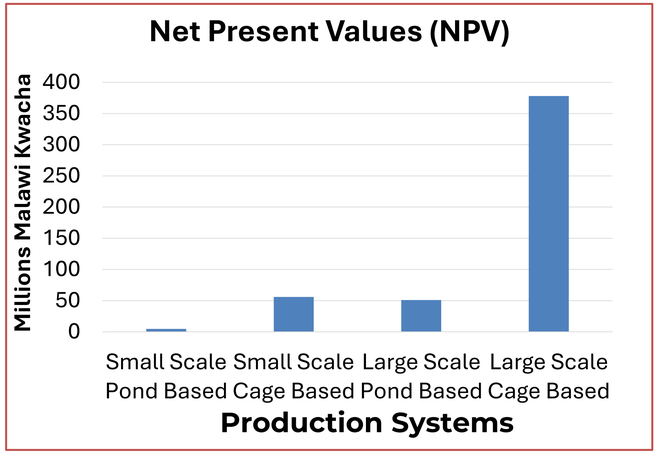
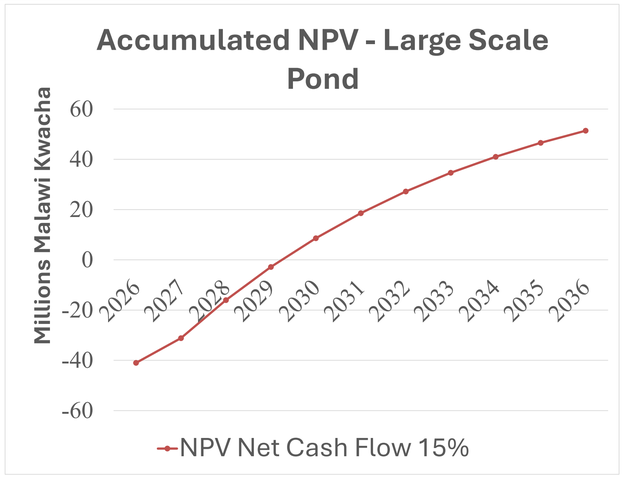


Figure 1: *Net present value (NPV) comparison of four aquaculture production systems*

Note: $1 = MWK 1,734 (Reserve Bank of Malawi, 2026)

- Cage systems generated substantially higher NPVs at both scales.



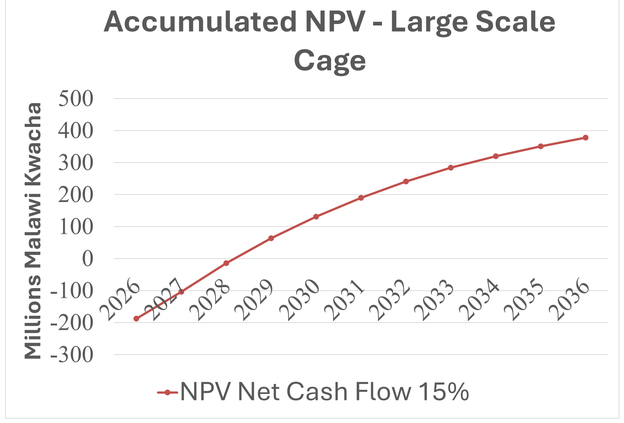


Figure 2: *Accumulated NPV for large scale pond vs. cage systems over 10-year horizon*

- Cage systems had a faster payback period than pond systems, indicating quicker investment recovery.
- All systems were financially viable (IRR > 15% discounting rate).
- Profitability is mainly driven by output price, feed cost, and production level, with price premiums strongly favoring cage systems.

CONCLUSION

Production efficiency is the main driver of economic performance in both pond and cage aquaculture, largely through differences in feed use and cost structure.

Profitability is strongly influenced by market prices, feed costs, and output levels, making these the key determinants of financial risk and returns.

Overall, both systems are viable in Malawi, but success depends more on input-use efficiency and market conditions than on production system type alone.

RECOMMENDATIONS

- Support both pond and cage systems based on efficiency rather than system type.
- Improve feed management and overall production efficiency through extension services.
- Strengthen market access to improve prices and income stability.
- Enhance access to affordable quality feed to reduce production costs.
- Promote farmer training and technical support for sustainable growth.

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