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## Women’s Role in Small-Scale Aquaculture Sector and Implications for Technical Efficiency: Empirical Evidence from Myanmar

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### Abstract

Myanmar’s aquaculture sector has grown rapidly over the last two decades and plays an essential role in national fish supply. However, the technical and economic characteristics of this sector, mainly small-scale aquaculture, have been poorly studied. This study addresses this knowledge gap by measuring the overall technical efficiency from the input-oriented approach, slacks associated with each input, and its determinants for 440 small-scale fish farms in the Delta region, Myanmar. In order to account for both bias and serial correlation of conventional DEA (CDEA) scores, the two-stage double bootstrap DEA (BDEA) is used to correct for the bias of CDEA scores in the first stage and then produce the valid statistical inference in the second stage.

Results reveal that most small-scale fish farmers in the study areas perform their fish production below the production frontier. Since there is evidence that efficiency scores through CDEA are biased and highly correlated, the efficiency score derived from this model (0.55) is higher than that from BDEA model (0.44). Therefore, farmers can reduce their input use by over 50 percent while still producing the same output levels. All the inputs used contained slacks such that all of them are over-utilized in inappropriate ratios. Regarding its determinants, women’s participation in decision-making process within the household and female labor contribution in fish production activities have a significant and positive effect on technical efficiency. Also, the use of fish farming practices, particularly polyculture and integrated agriculture and aquaculture (IAA) and climate-change adaptation practices are the most significant efficiency shifters. Together, the findings highlight the important need to promote interventions targeted at improving technical efficiency of small-scale aquaculture producers. Programs and policies aimed at increasing aquaculture productivity would benefit by including interventions to reduce gender inequality and promoting equity.

**Keywords:** Bootstrap truncated regression, data envelopment analysis, Myanmar, slacks, small-scale aquaculture, technical efficiency, women