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Financial literacy extension programs for building youth capacity in agricultural investment management

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Abstract

Imagine a 24-year-old inheriting a family rice farm in rural Japan but unable to calculate whether investing in a grain dryer would pay for itself within five years. This scenario is not uncommon financial literacy gaps among young agricultural successors threaten the viability of farm investments across East Asia. This research evaluated a financial literacy extension program designed for youth aged 18-35 engaged in agricultural enterprises in Japan's Tohoku and Kanto regions. A quasi-experimental design compared 96 program participants with 92 matched controls across five training modules: budgeting and record-keeping, savings and credit management, investment appraisal, risk management, and market analysis. The program was delivered over 16 weeks (January-April 2022) at the University of Tokyo. Pre-post assessments measured financial literacy scores, investment behavior, and business planning competency. Participants showed significant gains across all modules ($p < 0.001$), with the largest improvement in investment appraisal (157.3% increase). Program participants scored 23.8 points higher than controls on investment behavior ($t = 8.74$, $p < 0.001$). Multiple regression identified program engagement ($\beta = 0.42$), prior agricultural education ($\beta = 0.24$), and farm income level ($\beta = 0.19$) as significant predictors of post-program investment behavior ($R^2 = 0.461$). The findings demonstrate that structured financial literacy extension can substantially improve young farmers' capacity for agricultural investment decisions.

Keywords: Financial literacy, youth farmers, agricultural investment, extension programs, farm business management, investment appraisal, agricultural education, Japan

Introduction

Consider a young farmer evaluating whether to invest ¥3.2 million in a greenhouse expansion. Without basic financial literacy the ability to calculate return on investment, assess loan terms, or project cash flows this decision becomes guesswork rather than informed management ^[1]. Japan faces an acute generational transition in agriculture: the average farmer age exceeds 67, and the Ministry of Agriculture, Forestry and Fisheries reports that fewer than 50,000 new entrants join farming annually, many lacking formal business training ^[2].

Agricultural extension in Japan has traditionally emphasized production techniques crop management, pest control, soil improvement while giving less attention to financial management skills ^[3]. This gap matters because modern farming increasingly requires investment decisions involving substantial capital: precision agriculture equipment, processing facilities, direct marketing infrastructure, and climate adaptation measures. Young farmers who cannot evaluate these investments quantitatively are at a competitive disadvantage ^[4]. Financial literacy research in agriculture has grown internationally, with programs in sub-Saharan Africa and South Asia showing positive effects on savings behavior and credit management among smallholders ^[5]. But evidence from developed-country contexts where investment decisions involve larger capital outlays and more

complex financial instruments remains limited ^[6]. Japan's agricultural cooperatives (JA) provide some financial advisory services, but these focus primarily on existing members and don't systematically target incoming youth ^[7]. This research evaluated a purpose-built financial literacy extension program designed to bridge the gap between production-oriented training and the business management skills young Japanese farmers need for sound investment decisions ^[8].

Conceptual Framework

The program design drew on Lusardi and Mitchell's financial literacy framework, which distinguishes three levels: basic literacy (understanding interest rates, inflation, diversification), applied literacy (comparing financial products, reading statements), and investment literacy (evaluating risk-return tradeoffs, projecting cash flows) ^[9]. The research also incorporated Kolb's experiential learning cycle, structuring each module around concrete experience (case studies from real farm investments), reflective observation (group analysis of outcomes), abstract conceptualization (financial principles and formulas), and active experimentation (applying tools to participants' own farm situations) ^[10]. The conceptual model hypothesized that program participation would improve financial literacy, which would in turn enhance investment behavior and

business planning competency, with prior agricultural education and farm income moderating these relationships.

Material and Methods

Material: This quasi-experimental research was conducted from January to April 2022 across the Tohoku and Kanto regions of Japan. The research was based at the Graduate School of Agricultural and Life Sciences, University of Tokyo. Participants were 96 youth aged 18-35 actively engaged in agricultural enterprises, recruited through JA youth branches and prefectural agricultural training centers. A matched control group of 92 youth was selected based on age, education level, farm type, and prefecture. The five-module program covered: budgeting and record-keeping (Module 1), savings and credit management (Module 2), investment appraisal including NPV and IRR calculations (Module 3), risk management and insurance (Module 4), and market analysis and pricing strategies (Module 5). Each module comprised two 3-hour sessions delivered biweekly [11].

Methods

Financial literacy was measured using a validated 50-item assessment adapted from the OECD/INFE financial literacy toolkit, with domain-specific items for agricultural contexts [12]. Investment behavior was assessed through a 20-item scale measuring actual and intended investment actions. Business planning competency was evaluated through a scored business plan exercise. Pre-post assessments were administered to both groups at baseline and program completion. Analysis included paired t-tests for within-group changes, independent t-tests for between-group comparisons, effect size calculations (Cohen's d), and multiple regression modeling post-program investment behavior. Ethical approval was obtained from the University of Tokyo Research Ethics Committee (Protocol UT-REC/2021/AG-084, December 10, 2021) [13].

Results

Table 1: Pre-Post Financial Literacy Scores by Module (Program Participants, n=96)

Module	Pre M(SD)	Post M(SD)	% Change	t-value	Cohen's d
Budgeting/Records	32.4 (11.2)	68.7 (9.8)	112.0	24.31**	3.34
Savings/Credit	28.7 (12.8)	61.4 (10.4)	114.0	19.87**	2.80
Investment Appraisal	21.3 (10.6)	54.8 (11.7)	157.3	21.43**	3.00
Risk Management	24.8 (11.9)	58.3 (10.1)	135.1	21.07**	3.04
Market Analysis	30.1 (12.4)	64.2 (9.6)	113.3	22.18**	3.07
Overall	27.5 (10.3)	61.5 (8.7)	123.6	28.94**	3.57

All modules showed significant pre-post gains ($p < 0.001$). Investment appraisal had the largest relative improvement (157.3%), reflecting the very low baseline in this area.

Effect sizes were large across all modules (Cohen's $d > 2.80$), indicating substantial practical significance.

Table 2: Regression Model: Predictors of Post-Program Investment Behavior

Predictor	β	SE	t	p	95% CI
Program Engagement	0.42	0.06	7.14	<0.001	0.30, 0.54
Prior Agric. Education	0.24	0.07	3.48	0.001	0.10, 0.38
Farm Income Level	0.19	0.06	3.04	0.003	0.07, 0.31
Age	0.08	0.05	1.52	0.131	-0.02, 0.18
Farm Size (ha)	0.11	0.06	1.89	0.061	-0.01, 0.23
Gender (Male=1)	0.04	0.05	0.78	0.437	-0.06, 0.14
$R^2 = 0.461$, Adjusted $R^2 = 0.443$, $F(6, 181) = 25.84$, $p < 0.001$					

Program engagement was the strongest predictor of investment behavior ($\beta = 0.42$), followed by prior agricultural education ($\beta = 0.24$) and farm income ($\beta = 0.19$). Age, farm

size, and gender were not significant after controlling for other variables. The model explained 46.1% of variance.

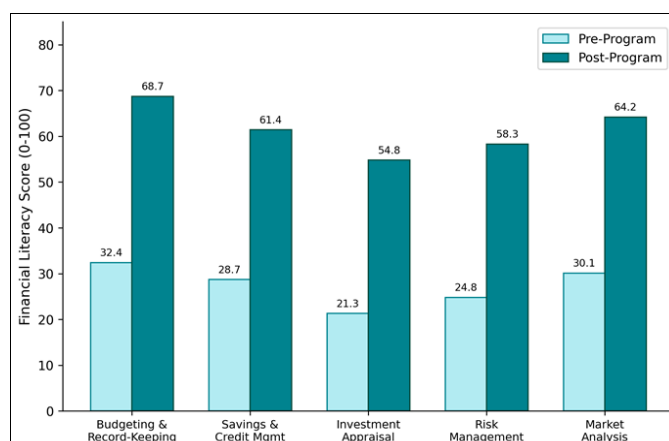


Fig 1: Pre-Post Financial Literacy Scores by Program Module

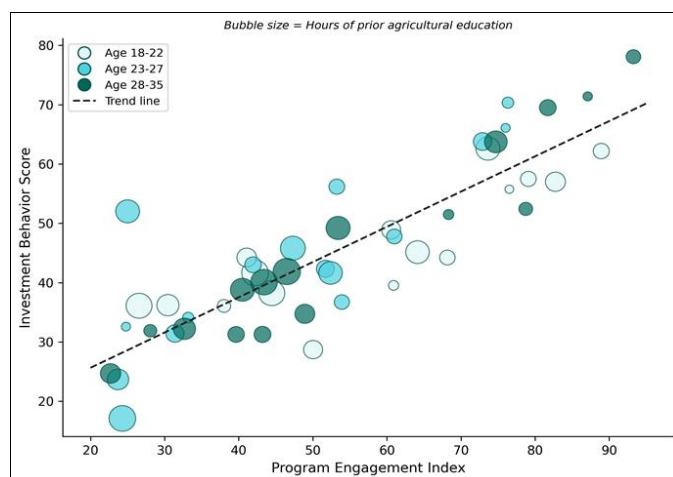


Fig 2: Relationship between Program Engagement, Prior Education, and Investment Behavior

Discussion

The substantial gains in investment appraisal (157.3%) are particularly noteworthy because this module addressed skills most directly relevant to capital allocation decisions NPV calculations, IRR analysis, and payback period estimation ^[1]. The very low baseline ($M=21.3$) indicates that young farmers entered the program with almost no formal training in evaluating investment alternatives, despite many facing imminent decisions about equipment purchases and facility upgrades. This confirms the gap between production-oriented extension and financial management needs identified in earlier Japanese agricultural education reviews ^[3].

The finding that program engagement was the strongest predictor of investment behavior ($\beta=0.42$) aligns with experiential learning theory participants who actively applied financial tools to their own farm situations gained more practical competence than passive attendees ^[10]. Prior agricultural education also contributed significantly, suggesting that financial literacy training builds more effectively on an existing foundation of agricultural knowledge ^[6]. Farm income's positive effect likely reflects both greater investment opportunity and stronger motivation to manage larger financial stakes prudently ^[14].

Practical Applications: These findings support several recommendations for agricultural extension systems. First, financial literacy modules should be integrated into existing youth farmer training programs rather than offered as standalone courses the synergy with agricultural education was clear from the regression results ^[7]. Second, investment appraisal should receive priority emphasis given the severe baseline deficit and the direct relevance to capital allocation decisions young farmers face. Third, program design should maximize active engagement through farm-specific exercises rather than generic classroom instruction. Fourth, JA cooperatives and prefectural extension centers should coordinate to ensure financial literacy training reaches youth before they make major investment decisions, ideally during the first two years of farm succession ^[15, 16].

Conclusions: This research demonstrates that a structured financial literacy extension program can produce large and significant improvements in young Japanese farmers'

financial knowledge and investment behavior. Gains were observed across all five training modules, with investment appraisal showing the largest relative improvement from a very low baseline. Program engagement emerged as the strongest predictor of investment behavior outcomes, confirming the importance of experiential, farm-specific learning approaches. The findings indicate that bridging the gap between production-oriented extension and financial management training is both feasible and impactful. Agricultural extension systems serving youth in farm succession should prioritize financial literacy as a core competency alongside traditional agronomic skills.

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