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Food Brigade Program in Realizing the Strengthening of the Farmer Household Economy: An Analysis of the Impact Pathway and Policy Implications in Pinrang Regency

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Abstract
This study aims to analyze the economic development impact pathway and economic mechanism of the Food Brigade Program in strengthening the farmer household economy in Pinrang Regency and formulate policy implications to strengthen the program's contribution to the farmer household economy. The research uses a qualitative approach with Impact Pathway Analysis and Process Tracing. Data were obtained through in-depth interviews, observations, and documentation studies of 15 informants consisting of program recipient farmers, non-recipient farmers as qualitative comparators, program managers, and agricultural extension workers. The data was analyzed in a descriptive qualitative manner by tracing the stages of change from program interventions, changes in farming practices, adjustments in household economic decisions, to strengthening the farmer household economy. The results of the study show that the Food Brigade Program contributes to strengthening the household economy through agricultural mechanization, group organization, and technical assistance that encourages changes in farming practices. The most consistent impact can be seen on the efficiency of farming businesses, especially time savings and reduction of labor needs in certain activities. These changes further affect labor allocation, cost structure, income strategies, and household risk management. Economic strengthening can also be seen from the ability to meet daily needs and some households have the ability to save, while income stability is still relative because it is influenced by seasonality, productivity, pests, production costs, and grain prices. Policy implications show the need to strengthen the mechanization ecosystem, group institutions, technical and economic assistance, as well as market access and integrated risk management so that the benefits of the program can be more sustainable at the farmer household level.

INTRODUCTION

In supporting economic and human development, food security is one of the important instruments that must be considered, especially in countries that still have dependency on the agricultural sector. As is known, the agricultural sector not only functions as a food provider, but also as a source of income and job creation that can provide opportunities for labor absorption for rural households, as well as contribute to regional economic development (FAO, 2022) (Salsabila & Wulandari, 2025) (Mizik et al., 2025). In Indonesia itself, strengthening food security is also an important agenda for national development to encourage food self-sufficiency and economic growth. However, the main problems for households that still depend on agriculture for their livelihoods are farmer regeneration, limited use of agricultural technology, and limited economic capacity of farmer households. Therefore, it is not enough for agricultural development

to be directed only at increasing the production of agricultural products, but also to pay attention to how changes in farming practices can provide economic benefits at the farmer household level.

The government has addressed this growing issue by developing the Food Brigade Program through the Ministry of Agriculture of the Republic of Indonesia, as a millennial farmer empowerment program that integrates the organization of young farmers, the provision of agricultural tools and machinery, training, and mentoring, as well as access to inputs and markets (Kementrian Pertanian Republik Indonesia, 2025). This program places agricultural modernization and farmer capacity building as part of a strategy to increase the effectiveness of farming. Several studies show that through agricultural modernization, it will be able to support increased productivity, while strengthening farmer capacity and education is an important part of solving smallholder problems and farming sustainability (Ramija et al., 2025) (Sulistyowati et al., 2023). With the help of the Food Brigade, the Food Brigade can not only be understood as an intervention in the agricultural process, but also as a form of community-based empowerment that seeks to connect technology, farmer institutions, knowledge, and farm business management.

However, in its implementation, the program faces several institutional and contextual challenges. As Arsyad et al (2025) In his research, it shows that there are problems of agreement between land owners and cultivators, cross-sector coordination, the suitability of the formation of the Food Brigade with technical instructions, and overlapping policies. Another challenge is that the response of farmer groups is not optimal regarding this program (Nurbaiti et al., 2025). In the broader context of agricultural modernization, technological change also faces structural and institutional problems, such as limited technology adoption, land fragmentation, the dilemma between mechanization and labor, infrastructure, policy support, and vulnerability to climate change (Yogi et al., 2025). These conditions indicate that the existence of a program intervention does not automatically result in economic change. The effectiveness of a program depends largely on how the intervention is translated into practice, how actors respond to it, and how institutional and socioeconomic conditions influence the change process.

This perspective is in line with the Theory of Change approach and impact pathway analysis which places program change as a process that takes place through a number of intermediate stages. Impact does not occur automatically after the intervention is given, but depends on the functioning of the mechanism that links the intervention to changes in behavior, practices, and economic conditions at the beneficiary level (Belcher et al., 2024) (Le Port et al., 2019) (Friesen et al., 2022) (Thornton et al., 2017). Therefore, in the context of agricultural development, it is important to ask not only whether a program produces change, but also how it takes place and through what economic mechanisms it is passed on to affect the conditions of farmers' households. This kind of approach allows analysis to take into account intermediate changes, including changes in farming practices, resource management, labor utilization, production costs, income strategies, and household economic risk management.

The empirical review of the implementation of the Food Brigade Program in Indonesia still discusses program implementation, farmer group responses, and policy and institutional challenges (Ramija et al., 2025) (Nurbaiti et al., 2025) (Arsyad et al., 2025). In fact, in the context of agriculture, we cannot stop there. As research using *the Theory of Change* and *Programme Impact Pathway* in the context of agricultural intervention shows the importance of tracing the mechanisms of change and the influence of context on the success of interventions (Friesen et al., 2022) (Thornton et al., 2017). However, the study has not explicitly explained how changes in the intermediate stage translate into strengthening the economy of farmer households, especially

through changes in production costs, labor use, productivity, income strategies, and risk management. Thus, there is still room for research to understand the Food Brigade Program not solely in terms of the success of implementation or production achievements, but from the path of economic change that connects program interventions with the economic conditions of farmers' households.

Departing from these gaps, the analysis in this study is directed to explore how program interventions, which include agricultural mechanization, collective organizing, and technical assistance, translate into changes in farming practices, adjustment of household economic decisions, and subsequently contribute to strengthening the economic conditions of farmers' households. The research also pays attention to institutional factors and socioeconomic contexts that can strengthen, weaken, or hinder the path of change.

METHODS

The research approach used in this study is qualitative descriptive by combining Impact Pathway Analysis and Process Tracing. The use of Impact Pathway Analysis aims to understand the pathway of change that connects program interventions with outcomes through the stages of change in between, while Process Tracing is used to trace the mechanism that connects each of these stages based on empirical evidence in the case studied (Springer-Heinze et al., 2003) (Beach & Pedersen, 2019). The research analysis framework is directed at the intervention pathway of the Food Brigade Program, changes in farming practices, adjustments to household economic decisions, and strengthening the household economy of farmers.

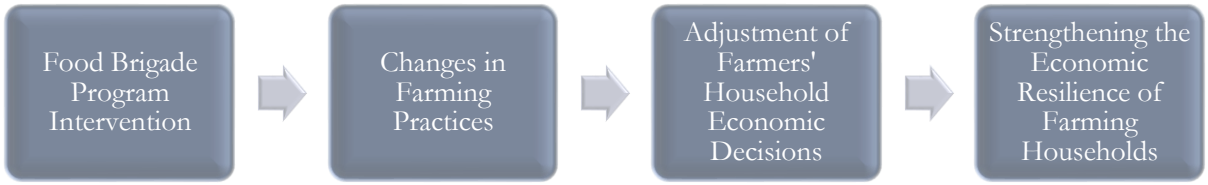


Figure 1. *Research Analysis*

With this approach, the research not only looks at the final results of the program, but also traces how change takes place, the economic mechanisms that work, and the conditions that strengthen or hinder the path of change. This approach is in line with the Theory of Change which places mechanisms and intermediate changes as an important part in explaining the contribution of a program to development outcomes (Belcher et al., 2024) (Thornton et al., 2017).

The research was conducted in Pinrang Regency, South Sulawesi. The informants were selected purposively based on their involvement and experience in the Food Brigade Program and farming activities. The informants totaled 15 people, consisting of eight beneficiary farmers (PP1–PP8), three non-recipient farmers (PNP1–PNP3), two program administrators (PENG1–PENG2), and two Field Agricultural Extension Workers (PPL1–PPL2). Recipient farmers were the main source for understanding changes in farming practices and household economic decisions, while administrators and PPLs provided information on program implementation and assistance. Non-recipient farmers were placed as qualitative comparators, not as control groups, to help see conditions and practices that also took place outside of program recipients. Data were collected through in-depth interviews, observations, and document studies related to programs and policies.

Data analysis was carried out qualitatively by tracing the evidence at each stage of the impact pathway and identifying mechanisms that explain the relationships between the stages. The information obtained was then compared to see the consistency of the findings, while information from non-recipient farmers was used to strengthen the interpretation and limit attribution to the program. The validity of the data was strengthened through source triangulation and method triangulation, as well as process tracing to ensure that the interpretation of household economic changes was related to the evidence at the previous stage. Thus, the analysis was directed to explain how and through what mechanisms the Food Brigade Program contributed to strengthening the household economy of farmers.

RESULTS AND DISCUSSION

1. The Impact Path of the Food Brigade Program in Strengthening the Farmer Household Economy

a. Food Brigade Program Intervention

The intervention of the Food Brigade Program for farmers who receive the program takes place through three main forms, namely mechanization and access to agricultural tools and machinery, collective organization, and technical assistance. This can be seen in the use of combine harvesters at the harvest stage as a manifestation of mechanization. PP2 as one of the informants from the representatives of farmers who receive the program explained that the tools that are assistance from the government *are "only used during the harvest season",* while in land cultivation, farmers still use personal tools. The use of combine harvesters is felt by the benefits of the farmers receiving the program because it can speed up work, especially harvesting. As stated in PP2, *"one hectare can be completed in 20 minutes"*. However, these benefits have not been able to reduce overall production costs, as PPL1 states that "the age of production is still the same," the effectiveness of mechanization is also influenced by weather and terrain factors.

These findings show that mechanization works primarily through operational efficiency, especially time savings and reduction in labor requirements in certain activities, rather than a reduction in total farm costs. These findings are supported by research that shows that mechanization as an instrument to improve the efficiency of the production process and reduce the burden of agricultural labor (FAO, 2022) (Takeshima, 2024). Therefore, mechanization is an early intervention that changes the way and speed of work, but the economic benefits still depend on field conditions and the availability of equipment.

In addition to mechanization, the organization of farmers through the formation of groups and technical assistance is an important part of this intervention. The results of the interviews show that the group functions mainly as a coordination and deliberation room. As explained in PP6, that group activities include "determining the planting schedule, the type of varieties planted, when to start tillage, cleaning irrigation canals", Meanwhile, the provision of assistance by PPL is carried out directly through directions on how to plant, use of tools, and pest control. PP2 even said that the usual companions come about five times a week and explained that the material presented was easy to understand because it was done through direct practice and using the regional language. Although it was conveyed by PPL that the understanding and participation of farmers did not show uniformity, the mentoring process still required further reinforcement and training. These findings show that Food Brigade interventions do not work only through the provision of technology, but through a combination of technology, institutional coordination, and knowledge transfer. Organizing provides a

mechanism for coordinating activities, while mentoring helps farmers translate program interventions into farming practices.

b. Changes in Farming Practices

The Food Brigade program provides real changes in farming practices for recipient farmers, especially in the use of agricultural tools and machinery, planting methods, and the regularity of their farming business management. As all recipient farmers (PP1-PP8) stated that there is a change in the use of tools, from manual work processes to the use of machines. PP2 explained, that the use of combine harvesters makes work faster. PP3 also states that the use of combine harvesters makes the harvesting process shorter because according to PP3 "one way directly becomes grain".

Other changes can also be seen from the way farmers plan and manage their farming business. All recipient farmers interviewed stated that they have calculated the costs they incur and estimated the harvest they will receive. Farmers have also begun to plan the use of tools, planting methods, and cost needs before production activities are carried out. Some farmers who received the program stated that farming activities have become more regular due to the assistance and scheduling programs from PPL and related parties.

Economically, these changes in practices have begun to change the factors of production, especially the efficiency of labor and time. The use of machines in certain processes makes the use of labor less. PP1 states that tools can reduce costs because "there is not too much labor used". However, the reduction in labor requirements does not mean that all production costs automatically decrease, as the cost of pesticides, fuel, input prices, seasons, and pests still affects the cost of farming. At the same time, farmers feel that work becomes faster and more efficient, while some informants state that the results are usually more. These findings are in line with research showing that agricultural mechanization can provide economic benefits in the form of increased productivity and income when farming conditions are favorable (Prayuginingsih et al., 2021). Meanwhile, Takeshima (2024) also showed that mechanization can change the use of domestic labor in agricultural activities.

Thus, changes in farming practices are an important stage in the impact path of the Food Brigade Program because interventions begin to translate into changes in the use of production factors and the way farms are managed. Mechanization speeds up the work process and reduces the need for labor in certain activities, while mentoring and organizing help farmers manage production activities in a more planned manner. This pattern is in line with the *impact pathway* approach that sees change as a series of stages that connect interventions to *outcomes,* rather than as a direct relationship between the program and the final result (Springer-Heinze et al., 2003) (Thornton et al., 2017).

c. Adjustment of Farmers' Household Economic Decisions

Furthermore, changes in farming practices translate into adjustments to household economic decisions, especially in the structure of production costs, family labor utilization, income strategies, and risk management. The results of the study show that agricultural mechanization not only changes the way of working, but also affects how farmer households allocate their resources. Expenditures that are still very felt for farmer households in terms of production are for the allocation of pesticides, fuel, labor, and other inputs. The use of machinery can reduce the need for labor in certain activities, so that there are savings in the labor cost component, although the total cost of farming has not always decreased because it is influenced by seasons, input prices, fuel, and pest attacks. As PP1 stated in his statement*, "Yes because there is*

not too much labor used." These findings show that mechanization works through changes in the composition of costs and the use of factors of production.

The adjustments made by farmers who participate in the Food Brigade Program are also seen in the allocation of family labor. Some farmers still rely on their own labor, but the need for labor in certain activities becomes smaller after the use of tools. PP1 states, *"Self-labor depends on whether the crop is good and not too much labor is needed."* Thus, family labor is not completely replaced by mechanization, but rather its use is adjusted to the needs at each stage of production. This mechanism shows that technology can reduce the need for labor in certain jobs while providing space for households to allocate available labor to other activities. These findings are in line with Takeshima (2024) who shows that agricultural mechanization can change the pattern of household labor allocation both in agricultural and cross-sector activities.

In income strategy, household adjustment does not only depend on the results of farming. Some informants have additional sources of income through gardening, trading, working as handymen, construction workers, or other jobs. PP1, for example, states*, "Usually in the garden, trading,"* while PP2 says, *"Usually in the garden, usually working as a construction worker.* However, not all households diversify; PP6 states *"None."* This condition shows that the strengthening of the household economy takes place through different strategies according to the resources and opportunities that each household has. Diversification serves as a mechanism to reduce dependence on one source of income, especially when agricultural income faces uncertainty. This finding is in line with Wirakusuma (2020) who places diversification as one of the strategies of farmer households in utilizing various available economic resources.

However, the change in income strategy has not been followed by a fundamental change in the marketing channel. Most farmers still sell their produce through middlemen or traders, and some informants state that the pattern is relatively the same as before they joined the program. Thus, at this stage the economic mechanism that appears to be stronger is in the adjustment of income sources and the management of household resources, rather than changes in the market structure. Nevertheless, farmers perceive sales as more profitable when grain prices are stable. PP1 states that sales *are "more profitable with stable grain prices."*

Adjustment of economic decisions also takes place through the risk management of farming businesses. When faced with crop failure or price declines, farmers carry out several strategies, such as recultivating land and adjusting the use of pesticides based on seasonal conditions. PP1 states, *"Reducing pesticide use can be predicted through the growing season,"* and mentions that the program helps in dealing with these risks. At the household level, risk management strategies are also carried out through loans to meet sudden needs that are then paid after harvest. PP1 states that sudden needs can be met *"by borrowing, usually later after the harvest is paid",* while at the same time stating that they can save.

Thus, the economic mechanism at this stage can be formulated as a change in production practices to changes in energy needs and cost composition, which then helps in adjusting household resource allocation, diversifying sources of income and risk-facing strategies, to the ability of households to maintain economic needs. This path shows that the contribution of the Food Brigade Program to the household economy does not take place through a single mechanism. Mechanization provides space for energy and time efficiency, while assistance and changes in farm business management encourage farmers to make adjustments to costs, labor, income, and risks. However, the final result is still influenced by external conditions such as season, pests, input prices, and grain prices. Therefore, the adjustment of household economic

decisions is an important connecting stage between changes in farming practices and strengthening the farmer household economy.

d. Strengthening the Economy of Farmers' Households

The strengthening of the farmer household economy is seen through three aspects, namely the stability of farmers' income, the efficiency of farming businesses, and the increase in the economic resilience of farmers' households. The results obtained in this study show that the three aspects are starting to be seen, but the level of change is different. The most obvious impact is on the efficiency of farming and the ability to maintain household economic needs, while income stability is still influenced by seasons and market conditions.

A review of the income stability aspect showed that some farmers gave a perception by saying that income conditions were more stable than before participating in this program. PP1 in the interview said *"It is stable now,"* but when asked further, the same informant stated that the income *"still changes frequently"* due to the difficulty of predicting the season. Nevertheless, the income is still considered sufficient to meet daily needs. Other informants also attribute better profits depending on the stability of grain price conditions. The findings show that income stability does not mean the loss of income fluctuations, but rather the ability to maintain economic conditions. This is important, because farmers' household income is still affected by productivity, season, grain prices, and production conditions. Empirical findings in the context of Indonesian farmer households show that limited income from farming drives the importance of *off-farm* sources of income as an alternative to meet household needs and strengthen economic resilience (Harmini et al., 2025).

Farming efficiency is an aspect that also shows the most consistent impact in strengthening the economy of farmer families. Efficiency is reflected through the use of new customs and ways of working that can make activities completed faster, save time, and produce better perceived outputs. PP6, for example, states that farming is now *"more time-saving"* and the use of tools makes farming *"more efficient."* PP1 and PP2 also state that the results obtained are usually more. However, this efficiency does not mean that the overall cost of production is lower. Farmers still face changes in costs due to seasons and pests, while PPL1 states that "Production costs are still the same." Thus, the efficiency of farming in this study occurs mainly in operational efficiency, namely the use of time, labor, and a more efficient production process, while cost efficiency is still situational. This finding is in line with Prayuginingsih et al (2021), who found that mechanization in rice farming can increase farmers' productivity and income compared to farmers who do not use mechanization. Asis et al (2021) also found that mechanical planting systems can increase productivity while reducing the need for time and labor in planting activities.

The increase in the economic resilience of farmer households in this study can be seen from the ability of households to meet their daily needs, face sudden needs, and set aside some of their savings for savings. Most of the informants stated that the needs were sufficiently met. As PP1 stated "Enough," for sudden needs, farmers usually also used the method of borrowing first and being paid after harvest for production needs. At the same time, PP1 also stated that they were able to save, this pattern was also obtained from PP2 and PP3 informants. The findings show that there is an increase in household capacity to maintain economic sustainability, although it is not yet completely free from vulnerability. The ability to meet sudden production needs through loans shows that households are still using coping strategies, while the ability to save shows that under certain conditions there is economic space after basic needs are met. The findings of Harmini et al (2025) support the importance of diversifying income sources in

strengthening the economic resilience of Indonesian farmer households. Asih (2024) also found in his research that the involvement of Indonesian rural households in off-farm work is positively related to increasing household income and economic mobility. Based on these three aspects, the final *impact* of the Food Brigade Program on the farmer household economy can be said to have begun to take shape, but has not yet fully resulted in permanent economic stability. The most obvious impact is found in the efficiency of farming, especially the efficiency of time, labor, and production processes. The next impact can be seen in economic resilience, through the ability to meet daily needs and some households begin to have the ability to save. Meanwhile, income stability is still relative, as it is still influenced by season, productivity, pests, production costs, and grain prices. Thus, the Food Brigade Program contributes to strengthening the household economy, especially through increasing the capacity of households to run farming more efficiently and maintain their economic needs.

2. Policy Implications of the Food Brigade Program in Realizing Strengthening the Economy of Farmer Households

Strengthening the household economy of farmers through the Food Brigade Program is not enough to rely solely on the provision of agricultural technology. Therefore, policies need to be directed at strengthening the program ecosystem, especially the availability of equipment, group institutions, comprehensive assistance, as well as access to markets, and risk management. Existing mechanization assistance has been proven to provide benefits, especially in accelerating work and reducing the need for labor in certain activities, but its use is still limited to certain stages and its effectiveness is influenced by land and weather conditions. This indicates that more planned management of equipment is needed so that the benefits of technology can be felt more consistently. These findings are in line with Takeshima (2024) who shows that mechanization can change the use of household labor and economic activities outside of farming.

The next shift needs to be directed to group institutions and assistance to farmers who receive the program. Farmer groups in this program have functioned as a space for coordinating planting schedules, the use of tools, the management of production activities, and communication between farmers, while the presence of assistance from PPL helps farmers in the application of technology and farming practices. However, the understanding and participation of farmers is not completely uniform. Therefore, the mentoring process needs to be carried out in a sustainable manner and not only focuses on cultivation techniques, but also on farming business planning, cost management, labor utilization, and economic decision-making.

Furthermore, the existence of the program must be able to assist farmers in strengthening market access and household risk management strategies. The results of the study were obtained that most farmers still market their produce through traders or middlemen, while income still fluctuates according to season, productivity, yield quality, and grain prices. Thus, these conditions show that increased production and efficiency have not automatically resulted in stable household income. Policies need to strengthen price information, market access, negotiation and marketing ability to produce products, as well as encourage diversification of sources of income according to household capacity. This is in line with Harmini et al (2025) who show that off-farm income is one of the important sources of income for rice farming households in Indonesia and can support income diversification and household economic resilience.

Thus, the policy implications of the Food Brigade Program should be directed at strengthening the connectivity between technology, institutions, assistance, markets, and

household economic resilience. The program does not stop at increasing production capacity, but needs to ensure that farming efficiency can be passed on to more sustainable economic benefits for farmer households. The policy direction is important because the results of the study show that the most real impact currently lies in farming efficiency and the ability to meet economic needs, while income stability is still influenced by external factors such as season, pests, production costs, and grain prices.

CONCLUSION

It was found in this study that the Food Brigade Program contributes to strengthening the farmer household economy through a path of change starting from program interventions, changes in farming practices, adjustments to household economic decisions, to the creation of strengthening the farmer household economy. Interventions in the form of agricultural mechanization, group organization, and mentoring encourage changes, especially in the use of technology, time and labor efficiency, and more planned farm management. These changes further affect labor allocation, cost structure, income strategies, and risk management of farmhouses and households.

The most real and most consistent economic impact is on the efficiency of farming businesses, especially saving time, reducing the need for labor in certain activities, and improving the production process. Strengthening economic resilience is also beginning to be seen from the ability of households to meet their daily needs and some informants already have room to save. However, income stability has not been fully established because agricultural products still depend on the season, productivity, pests, and production costs, as well as grain prices. Thus, the contribution of the Food Brigade Program is more accurately understood as a process of strengthening the economic capacity of households to run farming more efficiently and maintain economic needs, not as an automatic and uniform increase in income for all farmer households.

The implications of the study show that the sustainability of the program's contribution requires an integrated strengthening of the availability and management of agricultural tools and machinery, group institutions, technical and economic assistance, market access, and household risk management. The program needs to move from the orientation of increasing production capacity to strengthening more sustainable economic benefits for farmer households.

The limitations of the study lie in the qualitative approach used to understand the process and mechanism of change in the context of Pinrang Regency, so this study is not intended to measure the impact of the program statistically or generalize the results to all recipients of the Food Brigade Program. *Non-recipient* farmers were used as qualitative comparators to reinforce interpretation and limit attribution, not as a control group.

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REFERENCE

Arsyad, M., Sulaiman, A. A., Nuddin, A., Jamil, M. H., Bahrun, A. H., Afgani, J. Al, Hasanuddin,

U., Pertanian, B., & Selatan, S. (2025). Menakar Tantangan Brigade Pangan dalam Mewujudkan Swasembada Pangan Assessing the Challenges of Food Brigade in Achieving Food Self-Sufficiency ketahanan pangan nasional (Badan Standarisasi Instrumen Pertanian Sulawesi Selatan , Pangan . Langkah ini bert. *Jurnal Penyuluhan Pertanian*, *20*(2), 95–108. https://doi.org/10.51852/3a9a7q98

Asih, D. N. (2024). Does Off-farm Employment Enhance the Welfare of Rural Households in Indonesia ? *International Journal of Agriculture System*, *12*(1), 65–75. https://doi.org/10.20956/ijas.v12i1.5217

Asis, Ardiansyah, R., & Jaya, R. (2021). Respon Pertumbuhan dan Produktivitas Dua Varietas Padi (Oryza sativa L .) pada Sistem Tanam Mekanis dan Manual Growth Response and Productivity of Two Rice Varieties (Oryza sativa L .) on Mechanical and Manual Cultivation Systems. *Jurnal Agronomi Indonesia*, *49*(2), 147–153. https://doi.org/DOI: https://doi.org/10.24831/jai.v49i2.35918

Beach, D., & Pedersen, R. B. (2019). *Process-Tracing Methods: Foundations and Guidelines* (2nd ed.). University of Michigan Press. https://doi.org/https://doi.org/10.3998/mpub.10072208

Belcher, B. M., Bonaiuti, E., & Thiele, G. (2024). Applying Theory of Change in research program planning : Lessons from CGIAR. *Environmental Science and Policy*, *160*(July), 103850. https://doi.org/10.1016/j.envsci.2024.103850

FAO. (2022). *The State of Food and Agriculture 2022. Leveraging automation in agriculture for transforming agrifood systems*. Food and Agriculture Organization of. https://doi.org/https://doi.org/10.4060/cb9479en

Friesen, V. M., Mudyahoto, B., Birol, E., Nyangaresi, A. M., Reyes, B., & Mbuya, M. N. N. (2022). Using a Programme Impact Pathway to Design, Monitor, And Evaluate Interventions to Commercialise Biofortified Crops and Foods (GAIN Working Paper No. 29). *The Global Alliance for Improved Nutrition (GAIN)*. https://doi.org/https://doi.org/10.36072/wp.29

Harmini, Harianto, Kusnadi, N., & Herawati. (2025). DETERMINANTS OF OFF-FARM HOUSEHOLD INCOME : EVIDENCE FROM RICE FARMERS IN INDONESIA. *Jurnal Agribisnis Indonesia (Journal of Indonesian Agribusiness)*, *13*(1), 214–222. https://doi.org/https://doi.org/10.29244/jai.2025.13.1.214-222

Kementrian Pertanian Republik Indonesia. (2025). *Brigade Pangan: Gerakan Nasional Bangkitkan Lahan Tidur Menuju Ketahanan Pangan Berkelanjutan*. https://www.pertanian.go.id/?show=news&act=view&id=7211

Le Port, A., Zongrone, A., Savy, M., Fortin, S., Kameli, Y., Sessou, E., Diatta, A. D., Koulidiati, J.-L., Kodjo, N. E., Kamayera, F., Mahamadou, T., Martin-Prevel, Y., & Ruel, M. T. (2019).

Program Impact Pathway Analysis Reveals Implementation Challenges that Limited the Incentive Value of Conditional Cash Transfers Aimed at Improving Maternal and Child Health Care Use in Mali. *Current Developments in Nutrition*, *3*(9). https://doi.org/10.1093/cdn/nzz084

Mizik, T., Nagy, J., Molnár, E. M., & Maró, Z. M. (2025). Challenges of employment in the agrifood sector of developing countries—a systematic literature review. *Humanities and Social Sciences Communications*, *12*(62), 1–16. https://doi.org/10.1057/s41599-024-04308-3

Nurbaiti, D., Wicaksono, M., & Sasvita, W. (2025). RESPON KELOMPOK TANI TERHADAP PROGRAM BRIGADE PANGAN DI KECAMATAN BABALAN KABUPATEN LANGKAT FARMER GROUP RESPONSE TO FOOD BRIGADE PROGRAM IN BABALANN DISTRICT , LANGKAT REGENCY. *JICN: Jurnal Intelek Dan Cendikiawan Nusantara*, *2*(3), 2399–2406.

Prayuginingsih, H., Fauzi, N. F., Badriyah, R., Jannah, F., Agribisnis, P. S., Pertanian, F., Jember, M., & Timur, J. (2021). Dampak mekanisasi pertanian terhadap perekonomian anggota kelompok tani Sumber Rejeki Kecamatan Bangsalsari, Kabupaten Jember. *Jurnal AGRISEP*, *20*(2), 251–264. https://doi.org/10.31186/jagrisep.20.2.251-264

Ramija, K. El, Listiawati, Nurzannah, S. E., & Rahmi, M. (2025). PETANI MILENIAL , KUNCI SUKSES PROGRAM BRIGADE PANGAN. *Buletin Teknologi & Inovasi Pertanian (BTIP)*, *4*(1), 1–6.

Salsabila, P., & Wulandari. (2025). Kajian Peran Sektor Pertanian dalam Pembangunan Ekonomi. *Journal of Economics Development Research*, *1*(3), 102–112.

Springer-Heinze, A., Hartwich, F., Henderson, J. S., Horton, D., & Minde, I. (2003). Impact pathway analysis: an approach to strengthening the impact orientation of agricultural research. *Agricultural Systems*, *78*(2), 267–285. https://doi.org/https://doi.org/10.1016/S0308-521X(03)00129-X

Sulistyowati, C. A., Afiff, S. A., Baiquni, M., & Siscawati, M. (2023). Community Supported Agriculture Potencies as a Solution for Small Farmers' Problems in Indonesia. *Analisis Kebijakan Pertanian*, *21*(2), 241–261.

Takeshima, H. (2024). Agricultural mechanisation and gendered labour activities across sectors: Micro-evidence from multi-country farm household data. *Journal of Agricultural Economics*, *75*(1), 425–456. https://doi.org/https://doi.org/10.1111/1477-9552.12564

Thornton, P. K., Schuetz, T., Förch, W., Cramer, L., Abreu, D., Vermeulen, S., & Campbell, B. M. (2017). Responding to global change : A theory of change approach to making agricultural research for development outcome-based. *Agricultural Systems*, *152*, 145–153.

https://doi.org/10.1016/j.agsy.2017.01.005

Wirakusuma, G. (2020). APA YANG MENDORONG DIVERSIFIKASI PENDAPATAN PETANI?: TINJAUAN EMPIRIS RUMAH TANGGA TANI PADI PROVINSI JAWA TIMUR. *Agrisocionomics: Jurnal Sosial Ekonomi Pertanian*, *4*(1). https://doi.org/https://doi.org/10.14710/agrisocionomics.v4i1.6091

Yogi, L. N., Thalal, T., & Bhandari, S. (2025). The role of agriculture in Nepal ' s economic development : Challenges , opportunities , and pathways for modernization. *Heliyon*, *11*(2). https://doi.org/10.1016/j.heliyon.2025.e41860