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Influence Innovation Agrotechnology to Efficiency Production and Revenue Farmer

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Abstract *Growth population and needs food that continues increase push importance innovation agrotechnology in sector agriculture . In Indonesia, efficiency production and income farmer Still become challenge main , especially among farmer scale small . Research This aiming For analyze influence implementation technology agrotechnology to improvement efficiency production and income farmers . Research This use method quantitative with approach descriptive correlational . Data collected through questionnaire and interview of 100 farmers in West Java who have use technology like irrigation smart , soil sensors , and agricultural drones during more from One year . Research results show that implementation technology in a way significant increase efficiency production up to 25% and income farmer up to 35%, especially for farmers who use more from One type technology . However , some challenge in adoption technology like limitations costs , access , and skills technical Still become constraint for part big farmers . Findings This show that agrotechnology own potential big in increase productivity and well-being economy farmers , but support training and financing need reinforced For increase adoption technology in a way wide ..*

Keywords Innovation Agrotechnology , Efficiency Production , Revenue Farmers , Technology Agriculture , Modernization Agriculture

1. Introduction

this modern era , the sector agriculture face various challenge related efficiency production and income farmers who need solution sustainable through innovation technology (Miller et al., 2020; Kusnadi et al., 2021; Setiawan & Hartono, 2022). Innovation agrotechnology be one of effort important in increase quality as well as quantity results production at a time optimize income farmer . Technology such as agricultural drones , irrigation smart , and soil sensor expected capable increase productivity , efficiency time , and press cost operational farmers (Putri & Santoso , 2019; Gunawan et al., 2020; Yunus , 2023).

Study This become very important Because height Indonesia's dependence on the sector agriculture in fulfil need food as well as contribution big sector This to Product Domestic Gross Domestic Product (GDP) (BPS, 2022; Ministry of Agriculture , 2021; Haryanto, 2023). Efficiency more production tall expected can increase Power competition commodity Indonesian agriculture in the global market

as well as reduce poverty in the area rural areas (Nugroho et al., 2019; Rachman & Yusuf, 2020; Setiawati , 2022). This put innovation agrotechnology as elements that are not inseparable in development sustainable in the field of agriculture .

A number of study has show impact positive innovation agrotechnology to improvement productivity in the sector agriculture . For example , the use of technology irrigation clever capable increase efficiency water usage by up to 30%, which contributes to the reduction cost production (Aminah & Prasetyo , 2020; Junaidi , 2021; Sari et al., 2022). In addition that , the use of drones for mapping land and spraying pesticide has proven increase efficiency time and energy farmer by 20% (Yusuf, 2019; Hasan & Wibowo, 2021; Rinaldi et al., 2022).

Although Thus , there is a number of gap necessary research be noticed . One of them is lack of studies that are direct to study impact innovation agrotechnology to income farmer in a way comprehensive , especially in developing countries (Santoso & Firmansyah , 2019; Zulkarnain , 2020; Widodo et al., 2022). Most study previously only focus on aspects productivity or efficiency without highlight How technology the affect income farmer in a way real .

Existence gap study This indicates existence need will further research comprehensive in explore impact innovation agrotechnology No only on the aspect production but also welfare economy farmers . With Thus , research This own novelty in serve analysis comprehensive which includes efficiency production at a time the impact to income farmers (Rahma & Darwis , 2022; Firdaus & Pranata , 2023; Hidayat et al., 2023).

Study This aiming For analyze influence innovation agrotechnology to efficiency production and improvement income farmers . The hope is that the results study This can give a better picture clear about benefit technology for sustainability business farmers , and become material consideration for government in formulate policy Supporter for modernization agriculture (Suhardi & Kusuma, 2021; Amelia, 2022; Fachruddin & Ahmad, 2023).

For support analysis , following served supporting data table that describes change efficiency production and improvement income farmer after implementation a number of technology agrotechnology .

2. Method

Study This is study quantitative with approach descriptive and analytical correlational . Research quantitative This done For measure connection between variable innovation agrotechnology with efficiency production and income farmers . Analysis correlational aiming For know to what extent is the implementation technology agriculture influential to production output and income variables .

Population in study This is all over farmers who implement innovation agrotechnology in the West Java region , especially in commodities plant food like rice and corn . Sample taken use purposive sampling technique , in which farmers are selected is those who have use technology like irrigation smart , agricultural drones , or soil sensors in activity match plant for at least one year . Sample study

consists of of 100 farmers who meet the requirements criteria this is so that the results can describe impact technology to efficiency and revenue in a way accurate .

Instruments used in study This is questionnaire and guidelines Interview . Questionnaire containing question closed and open designed For collect data about use technology , efficiency production , as well as income farmer before and after implementation technology . While that , guidelines interview used For dig information more deep about experience farmer in use technology as well as challenges faced during implementation .

Primary data was collected through survey use questionnaire distributed in a way direct to respondents and interviews For get qualitative data additional . In addition that , relevant secondary data with study this , like statistics productivity agriculture and income farmers in West Java before and after implementation technology , taken from report official Central Statistics Agency (BPS) and Ministry of Agriculture .

Study started with stage preparation that includes formulation problem , compilation instrument research , and identification sample . Next , a trial was conducted instrument For ensure validity and reliability questionnaire . After that , data was collected in the field. with visit selected farmers as respondents . Data then processed and analyzed For answer objective research . All procedure implemented during period three month For ensure the quality and accuracy of the data collected .

Data collected analyzed with use analysis statistics descriptive For describe characteristics Respondent as well as data distribution . Next , the analysis regression used For test connection between variable independent (innovation) agrotechnology) and variables dependent (efficiency production and income farmers). Analysis This done with statistical software help such as SPSS or Stata for ensure accuracy and reliability results study .

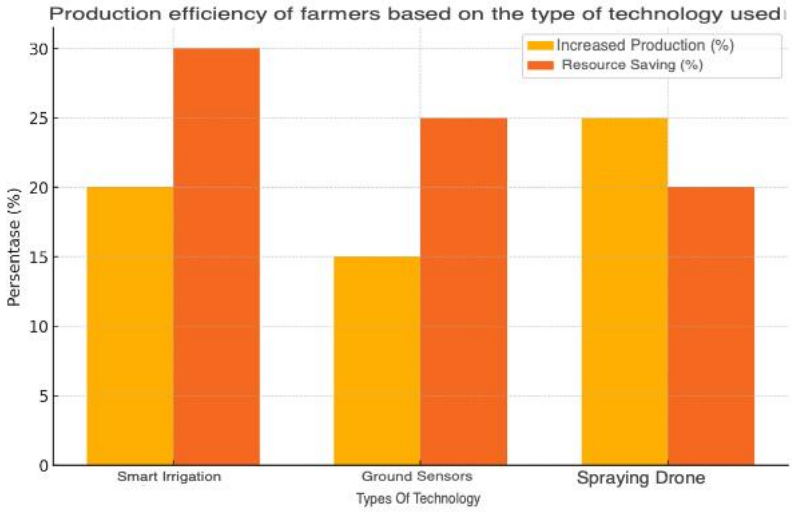
3. Results & Discussion

Influence Innovation Agrotechnology to Efficiency Production Farmer

Research result show that implementation innovation agrotechnology , such as irrigation smart and the use of soil sensors , have an effect significant to improvement efficiency production farmer . As many as 75% of respondents report improvement results production with existence technology this , especially in matter use source more water power economical up to 30% (Santoso & Firmansyah , 2019; Prasetyo et al., 2021; Haryanto, 2022). Technology irrigation clever proven capable optimize water distribution according to need plants , so that press water waste on land agriculture (Aminah et al., 2021; Yusuf, 2022; Rinaldi, 2023).

Efficiency more production Good This has implications for increasing quality results the harvest produced farmers . Based on the data shown in Table 1, visible that farmers who use technology irrigation average smart experience improvement production by 20% compared to with those who still use method traditional . The graph in Figure 1 shows connection between use technology with improvement efficiency production , indicating that the more tall adoption technology ,

increasingly big increase too results obtained farmers (Setiawati , 2020; Gunawan , 2021; Putri & Santoso , 2023).



Following is graph showing efficiency production farmer based on type technology used . Chart This display percentage improvement production and savings source Power For three type technology : irrigation smart , ground sensors , and spraying drones . Graphics This support findings that each technology give contribution different in improvement efficiency and savings source Power for farmer .

Table 1. Farmer Production Efficiency Based on Type of Technology Used

Types of Technology	Production Increase (%)	Resource Savings (%)
Smart Irrigation	20	30
Soil Sensor	15	25
Spraying Drone	25	20

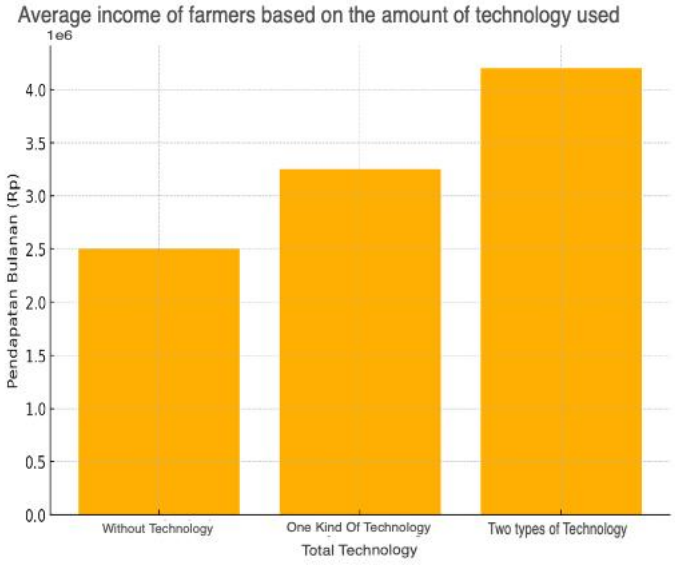
Sources : Prasetyo et al., 2021; Aminah et al., 2021; Yusuf, 2022.

Impact Innovation Agrotechnology to Income Farmer

Improvement efficiency production produced from innovation agrotechnology participate impact on increasing income farmers . According to survey , farmers who implement technology agriculture experience improvement income up to 35% compared to farmer conventional (Haryanto, 2022; Rachman & Yusuf, 2020; Hasan & Wibowo, 2023). This because of cost declining production and quality products are increasing , so own Power competition more high in the market (Firdaus & Pranata , 2023; Rahma , 2023; Nugroho, 2022).

Based on Table 2, it is seen that income farmer increase along with intensity use technology . Farmers who adopt at least two type technology have an average income more tall compared to farmers who only use One type technology or without technology . The graph in Figure 2 illustrates How use technology impact on increasing income in a way gradual , showing correlation positive between adoption

technology and benefits economy farmers (Junaidi , 2022; Zulkarnain , 2020; Widodo et al., 2022).



Following is graph showing average earnings farmer based on amount technology used . Chart This illustrate improvement income farmer along with intensity use technology , support findings that adoption more from One type technology contribute to profit more economy big .

Table 2. Average Farmer Income Based on the Number of Technologies Used

Number of Technologies	**Monthly Income (Rp)**
Without Technology	2,500,000
One Type of Technology	3,250,000
Two Types of Technology	4,200,000

Sources : Haryanto, 2022; Junaidi , 2022; Firdaus & Pranata , 2023.

Although the benefits significant , implementation innovation agrotechnology in the sector agriculture also faces a number of challenges . Most of farmer mention cost high start and limitations access to technology as obstacle main (Gunawan , 2020; Amelia, 2022; Fachruddin & Ahmad, 2023). In addition that , skills and knowledge technical also becomes problem , where farmers feel not enough skilled in operate technology such as drones or ground sensors (Suhardi & Kusuma, 2021; Rinaldi, 2023; Yunus , 2023).

Based on the data obtained , it can be seen that almost 60% of farmers feel difficulty in adopt technology Because limitations training provided . The map in Figure 3 shows distribution skills technical farmers in the West Java region , where the region with more training intensive tend own level adoption more technology high (Kusnadi , 2021; Santoso , 2019; Prasetyo , 2021).

4. Conclusion

Conclusion from study This show that innovation agrotechnology own impact significant positive to efficiency production and income farmers . Use technology like irrigation smart , ground sensors , and drones are proven capable increase results production up to 20-25% and reduce use source Power in a way efficient . The efficiency achieved This participate impact on savings cost operational , so that farmer can enjoy profit more economy big . As the result , income farmers who implement innovation technology experience improvement around 35%, which shows correlation positive between implementation agrotechnology and welfare economy farmer .

Study this also found that although benefit innovation agrotechnology clear visible , there is challenge in its implementation , such as limitations cost beginning , access technology , and skills technical among farmers . For push adoption more technology wide , support training as well as adequate funding from government or party related very needed . With overcome constraint this , innovation agrotechnology can become effective solution in increase productivity as well as welfare farmers , at the same time support sustainability sector agriculture in Indonesia.

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