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Links Between Internal Factors, External Factors, Implementation Of Standard Operational Procedure (SOP) with Shallot Farmers Productivity in Bondowoso

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ABSTRACT

The purpose of this study was to analyze the farmer's internal and external factors on shallot productivity through the implementation of Standard Operating Procedures (SOP) for shallot cultivation as an intervening variable in Bondowoso Regency. The research method is descriptive quantitative, with data collection methods using primary and secondary data. The research technique uses path analysis (Path Analysis) using SPSS. 22.0. The results of the analysis show that there is a significant influence of internal factors (X1) on shallot cultivation SOP (Z) this is based on the ρ-value which is smaller than α (0.000 <0.05), external factor variables (X2) have a significant effect on cultivation SOP red onion (Z) this is indicated by the ρ-value which is smaller than α (0.000 <0.05). The internal factor variable (X1) has a significant effect on shallot productivity (Y). This can be seen from the ρ-value which is smaller than α (0.013 <0.05). There is a significant influence between external factor variables (X2) on shallot productivity (Y) this is indicated by the ρ-value smaller than α (0.018 <0.05), as well as shallot cultivation SOP variable (Z) on Shallot productivity (Y) because the ρ-value is smaller than α (0.000 <0.05) so there is a significant influence between the shallot cultivation SOP variable (Z) on shallot productivity (Y). So it can be concluded that there is a significant influence between internal and external factors, through SOPs on shallot productivity in Bondowoso. Recommendations for shallot farmers in Bondowos to follow SOP for shallot cultivation as a whole to increase shallot productivity.

1. Introduction

Agribusiness as one of the government's leading economic sectors has an important role in improving people's lives. This is because Indonesia's natural resources make it possible. Agribusiness is grouped into three sub-systems, which consist of: first, the upstream agribusiness sub-system, which includes activities outside of agriculture (off-farm) such as biochemistry, agrochemicals (fertilizers and pesticides), agricultural tools and animal feed; while activities in agriculture (on the farm) such as nurseries/hatcheries, livestock cultivation, fisheries, plantations, and agriculture. Both sub-systems of downstream agribusiness include the processing of production results from the upstream agribusiness sector. The three sub-systems of supporting services, namely supporting services, include activities that support the agribusiness trade, distribution, transportation, and financing services sector (Wally *et al*., 2022; Lisanty *et al*., 2020).

Indonesian farmers often receive various assistance both in terms of training as well as machinery and finances, but there are still many farmers who neglect the planting methods that have been regulated in the standard operating procedures (SOP) that have been set when receiving training, this often happens to shallot farmers (RAHAYU *et al*., 2019). To increase shallot production, it is necessary to apply site-specific SOPs for shallots based on (Good Agricultural Practices) and GHP (Good Handling Practices) for farmers (Supriana. *et al*. 2016; Rahardjo & Wijaya, 2018). Supriana further explained that the GAP and GHP training was carried out through field schools, where farmers were able to increase productivity and quality in maintaining the continuity of availability and quality demanded by the market as well as directing products that were certified safe for consumption by controlling pests (Plant Destruction Organisms) that were environmentally friendly.

The implementation of GAP will not work well without good macro planning, including the availability of Standard Operating Procedures (SOP) for shallot cultivation. The existence of a Standard Operational Procedure (SOP) for shallot cultivation is a basic requirement in implementing GAP to produce quality products that are safe for consumption (Saptorini *et al*., 2020; Suciati *et al*., 2022).

The targets to be achieved through implementing the SOP for shallot cultivation in Bondowoso Regency are Productivity of>13 -15 tons/ha of wet bulbs for the rainy season, >17-20 tons/ha for the dry season; Bulb diameter of 2 - 2.5 cm; The uniformity of tuber shape and colour reaches at least 90%; Yield 70% to 80%. (Bondowoso agriculture service SOP document, 2021). The following are the results obtained for the last 3 years.

Table 1. Realization Data of the Shallot's Target by Bondowoso Farmers.

District and Village		Target	Realization
Grujugan	Kabuaran	100%	69%
	Wonosari	100%	72%
Maesan	Gambangan	100%	70%
	Tanah wulan	100%	71%
	Suco	100%	74 %
Sumber Wringin	Rejo agung	100%	74%
	Sumbergading	100%	73%

Source: Department of Agriculture, Bondowoso (2021).

Based on the data above and referring to the SOP for Shallots in Bondowoso, there are problems faced: the number of shallot harvests that have not reached the target seen from the shallot yields of farmers in 3 sub-districts with 7 villages that are productive in planting shallots, the target to be achieved is the certain yield of 80% with productivity> 13 – 15 tonnes/ha of wet tubers for the rainy season, > 17 – 20 tonnes/ha for the dry season. It is because farmers do not follow the Standard Operating Procedure (SOP) for planting shallots. Generally, farmers use techniques and habits that are common in their planting area. Farmers think, if they follow the SOP then the amount of investment for planting is too large while the results obtained are not greater than the procedure for planting conventional shallots (Simatupang, 2017; Andajani & Pratama, 2017)

Nurmala *et al*, (2012) explained the important factors that affect the productivity of shallot agricultural products consisting of internal factors and external factors. Internal factors consist of (i) age, (ii) formal and non-formal education (iii) farming experience, (iv) arable land area (v). External factors consist of (i) availability of facilities and infrastructure, (ii) availability of capital, (iii) intensity of counselling (iv) market opportunities, and (v) nature of innovation. All

factors are essentially a breakdown of the factors that affect productivity which has been combined from several expert opinions. One of the influencing factors is the application of the right Standard Operational Procedure (SOP).

Standard Operational Procedures (SOP) were developed through discussions with several parties as well as observations in the field to determine the stages of activities with optimal costs to produce optimal production (A'idah *et al*., 2022). As a consequence of not implementing Standard Operational Procedures (SOP) for shallot cultivation, it will result in waste of costs or cost reductions at several stages of cultivation activities which can affect shallot production. If the product obtained is not optimal, it will affect farmers' income (Uma *et al*., 2022; S.P *et al*., 2021).

This phenomenon has triggered researchers to try to raise several factors that are assumed to be important to find out what are the constraints on crop yields including internal factors and external factors on shallot productivity through the implementation of SOP for shallot cultivation.

The expected results of this research include providing information to shallot farmers about the variables that affect the implementation of SOPs for shallot cultivation and shallot productivity in Bondowoso Regency. Providing information to policymakers as a basis for improving the implementation of SOP for shallot cultivation in Bondowoso Regency.

2. Methodology

Based on the level of explanation, this research is included in the category of associative research, which is conducted to find out the relationship between two or more variables. This research was conducted by collecting data through a survey. The data collection tool used is a questionnaire (Simatupang, 2017). This design is the entire research plan that includes things that the researcher will do, from making hypotheses, and operational implications, to data analysis.

The research method used is descriptive and analysis verification. The descriptive method is a research method that aims to describe and explain the existing conditions in a company based on data and facts. Data and facts are collected and then systematically arranged to be analyzed till getting the conclusions.

The descriptive method was used to answer the first and second research problems related to internal factors and external factors in the implementation of SOP for shallot cultivation. The verification method is a research method used to test a theory. This research will try to produce new scientific information, the status of the hypothesis in the form of a conclusion whether a hypothesis is accepted or rejected (Charina *et al*., 2018). The verification method is used to answer the third to fifth problem formulations, including the Impact of internal factors, external factors and SOP implementation of shallot cultivation on shallot productivity.

This research was carried out for three months, from October 1 to December 31, 2021. The research was conducted in Bondowoso, especially in the central districts producing shallots including Maesan, Grujugan and Sumber Wringin Districts.

The population is a generalization area consisting of objects/subjects that have certain qualities and characteristics determined by the researcher to be studied and conclusions drawn (Charina *et al*., 2018). The population in this study was 206 shallot farmers in Bondowoso.

In research sampling according to (Novianti, 2020), if the subject is less than 100 people, it is best if the subject is taken altogether, if the subject is more than 100 people it can be

taken 10-15% or 20-25% or 25-50%. So the researchers used 50% multiplied by a population of 206 to get a sample of 103.

Departing from the problems to be studied, the research variables in this study include:

1. Internal factors (X1), indicators of internal factors in this study are: Age/age, formal education, non-formal education, shallot farming experience, cosmopolitanism.
2. External factors (X2), indicators of internal factors in this study are: Extension intensity Chaperone's Role, Availability of Facilities and Infrastructure Implementation of SOP for shallot cultivation (Z) with indicators of Site Selection, Determination of Planting Time, Seed Preparation, Land Preparation, Planting, Fertilizing, Watering, Weeding and Landfilling, OPT Control, Post-Harvest
3. Productivity of shallots (Y) with indicators Production in the rainy season, Production in the dry season, Bulb Diameter, Shape and colour uniformity, Yield

Based on the variables that have been described, the hypothesis in this study is as follows:

H1: It is suspected that the Internal Factor variable is significantly related to the Implementation of the SOP for Shallot Cultivation in Bondowoso Regency.

H2: It is suspected that the external factor variable is significantly related to the implementation of SOP for shallot cultivation in the Bondowoso district.

H3: It is suspected that the Internal Factor variable is significantly related to the Productivity of Shallots in Bondowoso Regency.

H4: It is suspected that the External Factor variable is significantly related to the Productivity of Shallots in Bondowoso Regency.

H5: It is suspected that the variable SOP Implementation of Onion Cultivation is significantly related to Shallot Productivity in Bondowoso Regency.

H6: It is suspected that the Internal Factor variable is significantly related to Shallot Productivity through the SOP Implementation of the Shallot Cultivation variable in Bondowoso Regency.

H7: It is suspected that the External Factor variable is significantly related to Shallot Productivity through the SOP Implementation of the Shallot Cultivation variable in Bondowoso Regency.

3. Results and Discussion

3.1 Relationship between Internal Factors and SOP for Shallot Cultivation

Based on the first hypothesis, internal factors are related to SOP for shallot cultivation. After testing and analyzing the data, the results obtained stated that internal factors had a significant relationship with the SOP for shallot cultivation in Bondowoso which was proven to be true or H1 was accepted. This could be due to aspects related to internal factors that have an impact on the SOP for shallot cultivation. Aspects of internal factors include Level of Education, Experience farming shallots and Cosmopolitanism.

The indicator with the highest response is cosmopolitan where the higher the level of cosmopolitanism (openness to the outside world to obtain information), the better in applying new technologies and new methods. One of the cosmopolitans is that most farmers are willing to follow the SOP that has been socialized by extension workers. Although not all SOP indicators for shallot cultivation are followed by farmers, at least farmers are willing to accept and implement some of the SOPs. Besides, it is also mandatory for farmers receiving shallot seed assistance to follow all the SOPs for shallot cultivation.

Meanwhile, the indicator with the lowest response is the experience indicator. Respondents felt that the longer the experience of shallot farming, the better the farmer's motivation in implementing the technology package. Generally, farmers who have long experience in shallot farming do not want to follow or comply with the SOP given on the pretext that they feel they have mastered the techniques in this shallot farming business. However, they demanded to get seed assistance with the condition that they would follow a small part of the SOP for shallot cultivation.

The results of testing the internal factor variables on SOP for shallot cultivation obtained a beta (β) value of 0.450 or a fairly high interpretation value with a ρ-value of 0.000. Because the ρ-value is smaller than α (0.000 <0.05), H0 is rejected so that there is a significant influence of internal factors on the SOP of shallot cultivation.

Meanwhile, in this study, there was a significant similarity in results with previous research conducted by (Charina *et al*., 2018) shows that the level of education, farmer participation in extension activities, farmers' perceptions of the complexity and observability of organic farming systems have a positive and significant effect on farmers' decisions in implementing SOPs for organic farming systems.

3.2 Relationship between External Factors and SOP for Shallot Cultivation

Based on the second hypothesis, external factors are related to SOP for shallot cultivation. After testing and analyzing the data, the results obtained stated that external factors had a significant relationship with the SOP for shallot cultivation in Bondowoso which was proven to be true or H2 was accepted. This is due to aspects related to external factors which have had a positive impact on the SOP for shallot cultivation in Bondowoso. Aspects of these external factors include Extension intensity. Assistant Role and Availability of Facilities & Infrastructure.

This is supported by the results of the descriptive analysis which states that in general, the respondents agree on the external factors of shallot farmers in Bondowoso. The indicator with the highest response is the companion role indicator. Respondents feel that there is a role of assistant/extension to influence farmers in cultivating shallots according to the SOP. The companion role provides many benefits for farmers. The most commonly felt benefit is as a source of information regarding the SOP for shallot cultivation. So, farmers can carry out consultations regarding the farming process carried out under the applicable SOP. Meanwhile, the indicator with the lowest response is the intensity of counselling. Respondents felt that the intensity of counselling greatly influenced the ability of farmers to implement modern farming. The intensity of counselling is felt to be lacking by shallot farmers because counselling is only given once a week and it is often difficult for assistant staff to be contacted to get information regarding the problems faced by farmers (Sasongko & Witjaksono, 2014; Afrizal *et al*., 2018).

The results of testing external factor variables on shallot cultivation SOP obtained a beta (β) value of 0.430 or a fairly high interpretation value with a ρ-value of 0.000. Because the ρ-value is smaller than α (0.000 <0.05), H0 is rejected so that there is a significant influence of external factors on the SOP of shallot cultivation following the supporting theories. in this study there are significant results in common with previous studies conducted by (Novianti, 2020) stated that the factors that influence the implementation of TSS in Mekarmukti Village include the availability of facilities and infrastructure and the characteristics of innovation which include relative advantage and trialability. (Sunartomo, 2016), shows that the performance of agricultural extension agents affects the level of

productivity through the improvement of programs related to institutions, the quantity and quality of extension agents as well as institutional improvement of farmer groups.

3.3 Relationship between Internal Factors on Shallot Productivity

Based on the third hypothesis, internal factors are related to shallot productivity. After testing and analyzing the data, the results obtained stated that internal factors had a significant relationship to the performance of shallot farmers in Bondowoso, which was proven to be true or H3 was accepted. This could be due to aspects related to internal factors that have been able to create shallot productivity. Aspects of internal factors include Level of Education, Shallot Farming Experience and Cosmopolitanism.

The indicator with the highest response is the X1.5 indicator with an index value of 76.4 or has a high interpretation. Respondents felt that the higher the level of cosmopolitanism (openness to the outside world to obtain information), the better the application of new technologies and new methods to increase the productivity of the shallot crop in Bondowoso. This is proven by the receipt of suggestions and input from extension workers to always pay attention to the SOP for planting shallots. Meanwhile, the indicator with the lowest response is indicator X1.4 with an index score of 7.3 or a moderate interpretation. Respondents felt that the longer the experience of shallot farming, the better the farmer's motivation in implementing the technology package. According to the respondents, even though they have long experience in shallot farming with high yields, but not accompanied by reasonable shallot prices, it is also not a guarantee that they will continue to be motivated to become shallot farmers. Because the role of the local and central government in maintaining the stability of shallot prices is the main motivation for farmers to continue to develop their shallot farming business.

The results of testing the internal factor variables on shallot productivity obtained a beta (β) value of 0.402 or a fairly high interpretation value with a ρ-value of 0.013. Because the ρ-value is smaller than α (0.013 <0.05) then, H0 is rejected thus there is a significant relationship between internal factors and shallot productivity following the supporting theories,

In this study, there were significant results in common with previous studies conducted (Arimbawa & Widanta, 2017), stating that the training had a positive and significant effect on the productivity and income of rice farmers in the Mengwi district. (Harahap *et al*., 2020), Education, experience, income and the role of government have an inverse effect on the success of farmers. The higher education, experience, income and the role of the farmer government do not necessarily support success as a shallot farmer.

3.4 The Relationship between External Factors and Shallot Productivity

Based on the fourth hypothesis, external factors are related to shallot productivity. After testing and analyzing the data, the results obtained stated that external factors had a significant relationship to the performance of shallot farmers in Bondowoso, proven to be true or H4 was accepted. This could be due to aspects related to external factors that have been able to create the performance of shallot farmers in Bondowoso.

The indicator with the highest response is indicator X1.2 with an index value of 79.4 or has a high interpretation. Respondents felt that there was a role of assistant/counsellor influencing farmers in cultivating shallots according to the SOP. The companion role provides many benefits for farmers. The most commonly felt benefit is easy access to purchasing fertilizers and pesticides for shallot plants. In addition, farmers can carry out consultations regarding problems that occur in their plants. Extension agents generally provide appropriate solutions for each problem. Meanwhile, the indicators with the lowest response are indicators

X2.1 and X2.3 with an index value of 74.2 or a moderate interpretation. Respondents felt that the intensity of counselling greatly influenced the ability of farmers to implement modern farming. For this reason, modern equipment is also needed to balance the input and suggestions of extension workers. In addition, farmers also complain about the availability of adequate facilities and infrastructure because the availability of facilities and infrastructure can help farmers achieve farming success.

The results of testing external factor variables on shallot productivity obtained a beta (β) value of 0.377 or a low interpretation value with a ρ-value of 0.018. Because the ρ-value is smaller than α (0.018 <0.05) then H0 is rejected thus there is a significant relationship between external factors and shallot productivity following the supporting theories. In this study there were significant results in common with previous studies conducted (Arimbawa & Widanta, 2017), land area and technology have a positive and significant effect on the productivity and income of rice farmers in the Mengwi district.

3.5 Relationship between SOP Cultivation of Shallots and Shallot Productivity

Based on the fifth hypothesis, shallot cultivation SOP is related to shallot productivity. After testing and analyzing the data, the results obtained stated that the SOP for shallot cultivation had a significant link to the performance of shallot farmers in Bondowoso, which was proven to be true or H5 was accepted. This could be due to SOP aspects of shallot cultivation related to the performance of shallot farmers in Bondowoso Regency. Aspects of the SOP for shallot cultivation are site selection and timing of planting. Seed Preparation. Land preparation. Planting. Fertilization. Irrigation. Weeding and heaping. pest control. Determination of harvest time.

The indicator with the highest response is the Z2 indicator with an index value of 80.8 or a high interpretation. Farmers determine the shallot planting period according to the instructions in the SOP for shallot cultivation. Shallot farmers through field agricultural extension workers are starting to pay attention to the right planting time according to the SOP. This is done so that the time for harvesting shallots matches market needs and demands so that the price of shallots is not too cheap and causes losses to farmers. Meanwhile, the indicator with the lowest response is the Z15 indicator with an index value of 71.6 or a moderate interpretation. Respondents felt that applying ZA fertilizer at the dosage according to the SOP for shallot cultivation had no effect. Farmers feel that the application of fertilizer does not always have to look at the SOP, but rather look at the condition of the plants and other factors such as weather and pest disturbances.

The results of testing the SOP variable for shallot cultivation on shallot productivity obtained a beta (β) value of 1.149 or a very high interpretation value with a ρ-value of 0.000. Because the ρ-value is smaller than α (0.000 <0.05) then H0 is rejected thus there is a significant effect of shallot cultivation SOP on shallot productivity under the supporting theories.

In this study, there were significant results in common with previous studies conducted by (Astuti *et al*., 2019) The results obtained from this study were, in the dry season, the seeds and insecticides that significantly affected shallot productivity. Meanwhile, during the rainy season, seeds, Phonska fertilizer, ZA fertilizer, Pearl NPK fertilizer and herbicides affect productivity. During the dry season, seeds have a very significant effect on increasing productivity and making a negative contribution to risk. Meanwhile, during the rainy season, the use of ponska fertilizer and Mutiara NPK can significantly increase productivity and reduce production risks. (Sunartomo, 2016), shows that the performance of agricultural extension agents affects the level of productivity through the improvement of programs related to

institutions, the quantity and quality of extension agents as well as institutional improvement of farmer groups.

3.6 Relationship between Internal Factors on Shallot Productivity through SOP Cultivation of Shallots

Based on the sixth hypothesis, internal factors are related to shallot productivity through SOP for shallot cultivation. After testing and analyzing the data, the results obtained stated that the indirect linkage of internal factors (X1¬) to the shallot productivity variable (Y) through the intervening variable shallot cultivation SOP (Z) was 0.517, which had a greater value than the direct linkage of the internal factor (X1) on the shallot productivity variable (Y) is equal to 0.402. The total effect of the internal factor variable (X1) on shallot productivity (Y) is 0.919 with details of a direct effect of 0.402 and an indirect effect of 0.517.

The results of this study indicate that the internal factors attached to shallot farmers have a significant influence on shallot productivity in Bondowoso. However, the presence of mediating or intermediary factors including the Implementation of the SOP for Shallot Cultivation shows a greater influence than the direct effect. It can be concluded that SOP Implementation of Shallot Cultivation has an important role in increasing shallot productivity to more than 100%.

If viewed from the application in the field directly, it shows that the results of shallot farming are very different between farmers who apply and do not apply the SOP for planting shallots. This is indicated by the fact that sub-districts have begun to pay attention to the implementation of the SOP for planting shallots which do not implement them because they have significant superiority in shallot yields, both in terms of tonnage, yield and diversity of shallot yields.

3.7 Relationship between External Factors to Shallot Productivity through SOP for Shallot Cultivation

Based on the seventh hypothesis, external factors are related to shallot productivity through SOP for shallot cultivation. After testing and analyzing the data, the results obtained stated that the indirect relationship between the external factor variable (X2) and the shallot productivity (Y) through the intervening variable SOP for shallot cultivation (Z) was 0.494, which had a greater value than the direct link between the factor variables. external (X2) to the shallot productivity variable (Y) which is equal to 0.377. The total linkage of external factor variables (X2) to shallot productivity (Y) is 0.871 with details of a direct effect of 0.377 and an indirect effect of 0.494.

This study proves that external factors consisting of the intensity of counselling, the role of assistants and the availability of facilities & infrastructure significantly influence shallot productivity but are not optimal because they only have a low interpretation. Applying the SOP for shallot cultivation is essential to produce high productivity.

Even though counselling from assistants is often carried out, if farmers' willingness to follow the SOP is still low, shallot productivity in Bondowoso Regency will also be low and vice versa. Therefore, to maximize external factors in increasing the productivity of shallots, applying the SOP by synergyzing between assistants and farmers is crucial.

4. Conclusion

Based on the research findings described in Chapter IV, the conclusions of this study are as follows: The results prove that Internal and External factors have a significant relationship to the SOP for shallot cultivation in Bondowoso. Both factors also have a significant relationship to the performance of shallot farmers in Bondowoso. The SOP for shallot cultivation has a significant link to the performance of shallot farmers in Bondowoso. There is an indirect relationship between internal factors and the shallot productivity variable through the intervening variable SOP for shallot cultivation in Bondowoso, whose value is smaller than the direct effect. This shows that internal factors do not require an intermediary variable SOP for shallot cultivation to affect shallot productivity because the internal factor variables already contain aspects in the SOP for shallot cultivation. The indirect linkage of external factor variables to shallot productivity through the SOP intervening variable of shallot cultivation in Bondowoso whose value is greater than the direct effect. This shows that the external factor variables of farmers are too broad to be measured on shallot productivity. Thus, SOP for farmers' shallot cultivation is needed so that external factors lead to increased shallot productivity.

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