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SEDAYU DISTRICT FARMERS' MOTIVATION ON INTRODUCTION RATS CONTROLLING TECHNOLOGY USING OWL

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ABSTRAK

Teknologi pengendalian hama semakin banyak dikembangkan di dunia pertanian untuk memastikan hasil panen yang lebih baik. Perkembangan teknologi pengendalian hama mengarah pada mengembalikan keseimbangan ekosistem alami sawah. Kecamatan Sedayu memiliki masalah serangan hama tikus yang membutuhkan solusi segera untuk mengembalikan produksi padinya. Teknologi pengendalian hama tikus dengan burung hantu dikenalkan kembali sebagai upaya penanggulangan hama tikus. Sebanyak 60 petani diukur tingkat motivasinya untuk mengetahui seberapa tinggi motivasi petani dalam pengenalan teknologi pengendalian hama tikus dengan burung hantu. Tingkat motivasi petani diuji dengan uji proporsi yang didapatkan lebih dari 50% petani memiliki motivasi yang tinggi, selain itu juga diukur tingkatan motivasi pada aspek *existence, relatedness* serta *growth* untuk mengetahui tingkatan motivasi petani pada masing-masing aspek tersebut.
Kata kunci: *burung hantu, hama, motivasi, tikus*

ABSTRACT

The pest control technology is currently developed in the world of agriculture to ensure better yields. The development of pest control technology has led to restoring the balance of the natural rice fields ecosystem. Sedayu district has rats attack problem that requires an immediate solution to restore rice production. Rat controlling technology with owls was reintroduced as an effort to control rats. A total of 60 farmers measured the level of motivation to find out how high the motivation of the farmers in the introduction of pest control technology for rodents and owls. The level of motivation of farmers was examined using the proportion test that found that more than 50% of the farmers had high motivation, besides that, the level of motivation on the aspects of existence, relatedness and growth was also measured to determine the level of motivation of farmers in each of these aspects.
Keyword: *owl, pest, motivation, rats*

INTRODUCTION

Rat pest control with owl is a pest control concept by utilizing natural enemies. The utilization of natural enemies is used as an effort to restore the rice field ecosystem to its ideal form. It is not eradicated but controlled so that there is no excessive population and the ecosystem can run in balance. Rats in Sedayu District are one of the pests that are troubling farmers. Sedayu District is one of the endemic locations for rat pests, especially rice fields that are on the border with Moyudan District. This location is the site of the most rat pest attacks because there are railroad tracks in the environment where there are many mounds that become rat nests. Rats use mounds like rice fields for their nests. On the border with the railroad tracks, there is a large enough distance in the form of a mound of earth so that it is at risk of becoming a nest for rat pests.

If one plot of rice fields is attacked with low intensity, then the harvest that can be obtained is only about 20-30 percent of the expected harvest. In addition, the quality of the rice produced if the rice is exposed to pests and diseases will decrease, the rice becomes more easily broken and the water content is high (Ratri et al., 2020). The two locations on the border are the site with the most severe rat attacks. Rats attack rice plants starting from the seedling phase to rice plants that are ready to harvest so farmers have the potential for large losses. Rats attack rice plants by gnawing rice stalks in order to keep their teeth from growing.

Control of pests and plant diseases is very rarely conducted. Pests that often attack are rats, stem borers, *walang sangit* (bug), stone javelin or ground bedbugs, Mealy bug, and brown planthoppers. Control that is highly recommended is integrated control, such as setting cropping patterns including varietal rotation and the use of natural enemies (Khairullah & Saleh, 2020). In the Sedayu Subdistrict area through which the Van Der Wijk channel passes in the northern part, it is preferable to plant rice, in contrast to the southern part because the water supply has been much reduced, so crop rotation can be carried out by taking into account the volume of water passing through the area.

Farmers have been introduced to the concept of pest control with natural enemies in every extension activity by field extension officers. Owls have also been introduced in the Sedayu District area, only when they were first introduced, there was still no means that facilitated the use of owls as rat pest control. In this period, owls are introduced to control rats by adding an owl house in the middle of rice fields. Owl cages are provided as a shelter for owls to hunt for rat pests. Farmers in some agricultural areas have encouraged owls to breed and hunt on their farms by installing artificial nest boxes (Kross et al., 2016). Owl is more likely to survive in locations with increased exposure to lower traffic and occupied locations with fewer road kilometers within a 1 km radius (Hinsdmarch et al., 2012). The rice fields in Sedayu District are not on the main road so it is still possible to use owls.

The owl used as a natural enemy for rat pests is the Tyto alba type that has a range of 12 Km with the ability to kill up to 3650 rats in a year (a pair of owls). Owls are birds of prey that secretly surprise their prey in surprise attacks. To achieve this, owls must accurately locate and follow their prey before launching an attack. (Fux & Eilam, 2009). The owl (Tyto alba Scopoli) is one of the most widely distributed bird species in the world, found on every continent except Antarctica (Taylor cit. Askew et al., 2007) and the most widespread wild animal species on Earth, and because they are thought to provide natural vertebrate pest control services, farmers in some agricultural areas have encouraged owls to breed and hunt on their farms by installing artificial nest boxes. (Kross et al., 2016). As predators of small mammals, the owl has a high food chain and therefore their numbers act as an indicator of change that is more common in the wider countryside (Cayford *cit*.Askew et al., 2007). Owl is more likely to survive in locations with increased exposure to lower traffic and occupied locations with fewer road kilometers within a 1 km radius (Hindmarch et al., 2012). The owl (Tyto alba) is the most frequently cited bird predator (86%), followed by the common kestrel (Falco tinnunculus; 11%) and the black-shouldered kite (Elanus axillaris; 11%) Unlike many other predatory birds, the breeding rate of owls usually responds to an abundance of food (Taylor *cit*. Labuschagne et al., 2016). Despite the relatively smaller size of owls, their high metabolic rate allows them to exhibit relatively high levels of consumption and are reported to feed up to a quarter of their body weight in prey daily (Marti et al. *cit*. Labuschagne et al., 2016).

Efforts to use owls as rat pest control by farmers require efforts to inspire farmers' motivation so that farmers want to move to apply it. Field extension officers brought material on controlling rat pests in the hope

that the rice field ecosystem would return to balance after the rat pest attack spreads. Owl is used as natural enemies to control the population of rat pests, not to destroy all the rats in the rice fields. The motive of farmers will be measured to determine how much motive level of farmers in the introduction of rat pest control technology with owls in Sedayu District.

RESEARCH METHOD

The research took place in Sedayu District, Bantul Regency, Special Region of Yogyakarta Province. Sedayu District is a sub-district that is directly adjacent to Moyudan District. Both districts have the problem of rat pests, especially around the border of the sub-district where there are railroads. Farmers as respondents were farmers in Sedayu District. They were divided into four villages with a total of 60 farmers. Farmers through farmer groups received counseling material in the form of controlling rats with owls. Thus, farmers were then given a questionnaire to measure the motivation of farmers in introducing technology to control rats with owls.

In addition to interviews using questionnaires, researchers also made observations with field observations regarding the construction of owl houses by farmer groups in several farmer group plots. The motivation of the farmers was then calculated by using the proportion test to assess how many farmers have high motivation in introducing rat pest control technology with owls.

The proportion test was used to test the hypothesis about the level of motivation of farmers in controlling rats using owls. The proportion test was calculated by comparing the value of Z_{count} with Z_{table} which will determine which hypothesis will be used, Hypothesis 0 (H_0) or alternative hypothesis (Ha). H_0 in this research was estimated to be less than or equal to 50% of farmers in Sedayu District who had high motivation in introducing rat pest control technology with owls. Meanwhile, it was estimated that more than 50% of farmers in Sedayu District had high motivation in introducing rat pest control technology with owls. This research used a significance level of 5% with the test criteria if Zhit is greater than or equal to Z_{table} then H_0 is rejected and Ha is accepted. Then if Zhit was smaller than Z_{table}. H_0 was accepted and H_a was rejected.

RESULT AND DISCUSSION

Extension workers provided materials and information on controlling rats with owls to foster interest in farmers to want to apply this technology. Farmers need evidence of the success of the new technology introduced to ensure the results that farmers would receive later. If it was still just a promise, then the opportunity for innovations introduced to farmers to be applied would be small. Farmers must be convinced by tangible evidence, following one of the conditions for innovation, namely being economically profitable. It must be profitable for farmers because the farming carried out by farmers has many risks that have the greatest impact on financing and crop yields.

The motivation of farmers in cultivating agroforestry-based agricultural commodities is influenced by various factors, both intrinsic and extrinsic (Kurniasari et al., 2019). Motivation for professional activity is the driver of personal professional growth and is determined by a complex system of internal and external impulses. As work gets harder, workers improve their qualifications (Sidorova, 2015). In this position, farmers are faced with a difficult situation in the form of rat pest attacks with high intensity. Based on Hammond et al. (2017) only a third of the population is potentially willing to try new interventions and recommends that sectors of the population should be identified and specifically targeted by development programs. Farmers who are research respondents in general, understand the reasons for carrying out these activities without subsidies for the benefit of the

environment, clearly believe that their actions will benefit wildlife, this is following what was conveyed by Mills et al. (2018).

In the introduction of rat pest control technology with owls, motivation indicators were chosen using Clayton Alderfer's theory (Siagian, 1995); the ERG theory. ERG motivation theory is one of the motivational theories that describe the drive from within the individual related to his existence, relationships with others (relatedness), and the desire to develop (growth). The control of rats with owls that would be carried out by farmers was considered by how farmers show their existence in pest control activities of rats with owls. After that, it was how farmers related to other farmer friends to realize rat pest control with owls and encourage farmers to grow.

The motivation of farmers in the Existence indicator showed the level of motivation of farmers in showing their presence in controlling rats with owls. Existence's motivation gave rise to the encouragement of farmers to attend rat pest control activities with owls. The level of motivation of farmers can be seen in Table 1.

Overall, the motivation for the existence of farmers is at the level of 94.69%. The highest level of motivation on the desired indicator showed as an active farmer. The farmer expressed his desire to be at the forefront of introducing rat pest control with owls. Farmers compete to obtain the most access to the technology introduced.

Next, it was the desire to obtain a guarantee of the success of the harvest with a motivation level of 95.00%. Farmers want their harvests to improve again after the attack of rat pests, so the presence of rat pest control technology with owls gives farmers hope to obtain better harvests. This must be shown with real numbers in the results of controlling rat pests in their fields. Therefore, farmers were motivated to look forward to better harvests by controlling rat pests through the use of owls.

Two other indicators; the desire to show real results in controlling rat pests and not to be underestimated by fellow members of the farmer group are at the motivation level of 94.58% and 93.75%, respectively. These two indicators were considered less desirable than showing as a farmer and being active and getting good harvest success. Rat pest control that will be carried out depends on the actions of farmers in the rice fields to facilitate owls present in the rice fields. While related to farmer groups, farmers feel that they were working together with other members of farmer groups to realize rat pest control.

The next motivation indicator was the relatedness motivation of farmers which described the motivation of farmers to relate to other people or parties. This motivation showed how the encouragement in farmers in the introduction of rat pest control technology with owls to cooperate with other farmer group members. The level of motivation that exists in farmers can be seen in Table 2.

Table 1. Farmer Existence Motivation Level

No	Indicator	Score Interval	Average Score	Motivation Level (%)
	Existence			
1.	The desire not to be underestimated by fellow members of the farmer group	0 – 4	3,75	93,75
2.	Desire to obtain guaranteed success of the harvest	0 – 4	3,80	95,00
3.	Desire to show as an active farmer	0 – 4	3,82	95,42
4.	Desire to show tangible results in rat control	0 – 4	3,78	94,58
	Total	0-16	15,15	94,69

Source: Data analysis, 2014

Table 2. Farmer Relatedness Motivation Level

No	Indicator	Score interval	Average score	Motivation level (%)
	Relatedness			
1.	Desire to obtain more farmer friends	0 – 4	3,78	94,58
2.	Desire to be more familiar with other farmer friends	0 – 4	3,78	94,58
3.	Desire to be more familiar with Field Extension Officers	0 – 4	3,82	95,42
4	Desire to work with sparsely farmers	0 – 4	3,83	95,83
	Total	0 – 16	15,22	95,10

Source: Data analysis, 2014

The indicator of the motivation of farmers' relatedness in the introduction of rat and owl pest control technology was shown by the relationship between other farmers and field extension officers. The highest level of relatedness motivation was at the point of wanting to cooperate with farmers who had land adjacent to them. The level of motivation showed a value of 95.83%. Farmers who had adjacent fields had the same pest problem. It was not impossible to become the next target of pests if they are not thoroughly controlled, for those farmers need to establish relationships with their neighboring fields to take care of each other, especially pest control.

Other parties who also want to be familiar with farmers in introducing rat pest control with owls are field extension officers. The closeness of farmers to the field extension workers gives farmers more clear information because it is easier for farmers to ask back what information the field extension officers carry. The level of relatedness motivation on familiarity with field extension officers is 95.42% that is higher than the desire to make friends with farmers and be more familiar with other farmers.

The farmer's desire to obtain more farmer friends and be more familiar with other farmers has the same level of motivation of 94.58%. Farmers can be more familiar and make more friends with farmers in introducing rat pest control technology with owls through visits and community service activities related to rat pest control called *gropyokan*. Farmers felt more compelled to be more familiar with field extension workers and could work together with farmers who have spread apart because field extension officers are a source of information and working with farmers in the same area provides peace of mind to maintain the desired harvest.

The next motivation assessed for its level of motivation was growth motivation, where this motivation was an internal drive to develop itself. Farmers' self-development in controlling rats with owls was indicated by the farmers' desire to master the technology. The level of farmers' growth motivation can be seen in Table 3.

Table 3 shows the value of the highest level of farmer growth motivation at the point of becoming a more advanced farmer. Farmers had the desire to grow into more advanced farmers by mastering various pest control methods so that they could maintain the rice field ecosystem properly. A good rice field ecosystem could support better production results. In addition to mastering cultivation techniques, pest control was important to understand so that crop yields were good as well.

The presence of the introduction of pest control with owls provided additional insight for farmers. Previously, farmers have already known about natural enemies who were friends of farmers, either in the form of insects or reptiles such as snakes.

Table 3. Farmer Growth Motivation Level

No	Indicator	score Interval	Average score	Motivation level (%)
	Growth			
1.	Desire to develop skills in rat pest control	0 – 4	3,77	94,17
2.	Desire to develop creativity in rat pest control	0 – 4	3,78	94,58
3.	Desire to add insight in rat pest control	0 – 4	3,80	95,00
4.	Desire to develop other technologies in rat pest control	0 – 4	3,75	93,75
5.	Desire to become a more advanced farmer	0 – 4	3,82	95,42

Source: Data analysis, 2014

Farmers had been given counseling on protecting the rice field ecosystem by conserving natural enemies. At the point of wanting to add insight in pest control has a motivation level of 95.00%. Farmers gained new insights into the conservation of owls as natural enemies of rat pest control. Farmers were encouraged to increase their knowledge of pest control in rice fields for various types of pests and their alternative control.

At the point of wanting to develop creativity in controlling rat pests, the level of motivation was not too far from the desire to add insight in controlling rat pests. The level of motivation of farmers to develop creativity in controlling rat pests was 94.58%. Farmers want to be creative to make an owl house as a shelter for owls to control rat pests. Owl houses are considered quite expensive because they had to last a long time in the middle of rice fields so farmers had to be creative so that they could still use owls to control rat pests in their fields.

The desire to develop skills in controlling rat pests had a motivation level of 94.17%. Still related to the creativity of farmers, farmer skills were needed to handle the use of owls to control rat pests. Farmers' creativity had to be accompanied by skills to realize what farmers wanted.

The lowest level of farmer growth motivation was at the point of encouragement to develop other technologies to control rat pests. In practice in the field, farmers had used several methods such as bait, poison, and *gropyokan* activities. Even in one location, there was a rice field plot that was used as a pilot for preventing rat attacks by surrounding the land with plastic so that it blocked the path for rats to enter the rice field area. Farmers had high hopes for using owls as rat pest control because they have seen success in the Demak and Moyudan districts. Farmers were not highly motivated to develop other technologies. The distribution of farmers based on their level of motivation can be seen in Table 4.

Table 4. Distribution of Farmers by Level of Motivation

No	Category (score)	Total (people)	Percentage (%)
1	Low (0 – 17)	0	0
2	Moderate (18 – 34)	1	1,67
3	High (35 – 52)	59	98,33
	Total	60	100,00

Source: Data analysis, 2014

Farmers who became respondents in this research were 60 with 98.33% having a high level of motivation and 1.67% of farmers having a level of motivation in the medium category. Farmers had high motivation in introducing rat pest control technology with owls. Farmers stated that rats were a serious pest attack and greatly disrupted their crops. The presence of the introduction of this rat pest control technology brought good news for farmers to overcome the problem of rat pest attacks.

In the proportion test based on the number of farmers who had high motivation, the Z_{count} value was 7.434. Z_{table} used as a comparison was 1.645. Thus, the accepted hypothesis was an alternative hypothesis. The accepted hypothesis showed that more than 50% of farmers had a high level of motivation in introducing rat pest control with owls.

More than 50% of farmers were highly motivated in introducing rat pest control technology with owls. Farmers had a strong urge to control rat pests because it had a huge impact on farmers' yields. Rat pests have a broad spectrum of attacks on paddy fields, rice seedlings to plants that were ready to harvest had the same attack risk. Farmers needed more tangible solutions to control the rat population so that attacks could be reduced. The goal was to restore the balance of the rice field ecosystem where there was an interaction of ecosystem components without any domination from one party such as rats.

Rats were the main nuisance to farmers in Sedayu District. Efforts such as *gropyokan* were still considered ineffective because they were not carried out simultaneously. Rat nested in mounds around the rice fields, when *gropyokan* was not carried out simultaneously, the rat could temporarily move to another location to escape. Therefore, land sanitation needs to be considered because unsanitary land conditions have the potential to bring rats. Not to mention that several locations in Sedayu District had borders with railroad crossings on the edges of which there were ditches and high earth mounds.

The high level of farmer motivation was described in the level of ERG motivation. Existence, relatedness, and growth were the points that measured the level of motivation. In this research, the highest level of motivation was found at the level of relatedness motivation of 95.10%. Farmers were encouraged to cooperate with other farmers because they had the same problem in the form of rat infestation. This rat pest attack had to be resolved together and simultaneously because if it was only done alone, its effectiveness was far from perfect.

The motivation levels for existence and growth were not highly different, respectively 94.69% and 94.58%. At the existence motivation level, it showed the drive from within the farmer to show his presence in the introduction of rat pest control technology with owls. Meanwhile, the level of growth motivation showed the encouragement from within the farmers to develop their capacity to be able to control rat pests with new technologies that are being introduced.

CONCLUSION AND SUGGESTION

More than 50% of farmers have a high level of motivation in introducing rat pest control technology with owls. Farmers are motivated by the introduction of rat pest control technology with owls because it gives hope for better crop yields. The highest level of motivation of farmers is in the relatedness aspect of 95.10%. Furthermore, the existence aspect is 94.69% and growth is 94.58%. The relatedness aspect shows the motivation of farmers to cooperate with other farmers considering that this technology is developed in communal areas on the expanse of farmer groups. The existence aspect shows the motivation of farmers to show their presence in the rat pest control efforts with owls. While the growth aspect shows the motivation of farmers to develop their knowledge in controlling rat pests with owls.

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