Internal and external factors of rice farming in the coastal area

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Abstract. This research aims to determine and described internal and external factors, which become the strengths, weaknesses, opportunities, and threats of rice farming in the coastal area of Maros Regency. A sampling of the study area was carried out by the census method by taking the entire population into a sample of 23 farmers who were members of the Pajalayya Baru Farmer Group and key informants as many as two people consisting of village officials and extension workers. The result of this research identifies that there were four aspects of internal and external factors that influenced the development of rice farming in Kurri Caddi, which were strengths, weaknesses, opportunities, and threats. The strengths consist of the available workers, cultivation land, farming experiences, farmer's productivity. The weaknesses consist of the lack of skills of the farmer, uncertified seed, unbalanced fertilizer use, bad-timing tillage, and farmers are reluctant to use new farming innovation. The opportunities consist of the emergence of new forms of employment, a group of farmers that provide the distribution of farming supports and facilities and strong community self-help. Threats consist of problems of road transportation facilities, attack of pests and diseases, Abrasion and erratic weather.

1. Introduction

The coast is a supported area between land and sea which is still influenced by sea characteristics such as tides, sea breezes, and saltwater osmosis, as well as the natural processes that occur on lands such as sedimentation and freshwater flow, and those caused by human activities such as deforestation and pollution. Coastal characteristics, viewed from the biological aspects of the region, coastal and marine space, and the resources contained therein, are unique so that human intervention in the area can cause significant changes, such as landscapes that are difficult to change, the process of meeting freshwater and seawater which produces a unique ecosystem [1,2].

Maros Regency is one of the level II regions in South Sulawesi Province and is the buffer area of Makassar City for its proximity. The capital of Maros Regency in the City of Maros has an area of 1,619.12 km² with approximately 250,000 people in which most are engaged in agriculture. Most of the rice production there is produced by the lowland rice; it accounts for 99.68 percent of the total production or 291,723.20 tons while the rest is 0.32 percent of paddy fields [3].

Administratively, Maros Regency is divided into 14 districts and 102 villages. Of the 14 districts, Marusu District is the lowest subdistrict of rice harvest area, which is 1,380.0 Ha. The District is located in a coastal area so that only a few of the community lives as rice farmers, like in Kuri Caddi Hamlet in Nisombalia Village. It is one of the coastal hamlets (near the sea) of four hamlets in Nisombalia Village, bordered by the coast to the west. Nisombalia Village itself consists of 4 hamlets, namely Mambue, Tala-Tala, Kuri Lompo, and Kuri Caddi.

Ponds become the main livelihood for the coastal people. Rice farming activities are very rarely found there because seawater may enter the paddy fields and make farmers facing obstacles in farming. In coastal areas, it is undeniable that saltwater osmosis will occur and have a major effect on soil salinity. As a result, the rice planted in coastal areas is likely to fail due to crop failure caused by saltwater. However, Kuri Caddi Hamlet is different, where some communities do rice farming besides pond farming. Therefore, it is necessary to know and to describe the internal and external factors that contain the strengths, the weaknesses, the opportunities, and the threats to do rice farming in Kuri Caddi Hamlet as a coastal area.

2. Methods

This research was conducted in the Kuri Caddi Hamlet, Nisombalia Village, Marusu District, Maros Regency, South Sulawesi Province from February to March 2019. The location selection was carried out by purposive sampling or deliberately consider that it was one of the areas that carried out rice farming in the coastal area. The population was all farmers in 23 paddy farms in the coastal area and were members of the Pajalayya Baru Farmer Group and two key informants from village officials and extension agents. The research sample was chosen based on Sudjana's opinion [4] that the census method occurs when each member or characteristic in the population is subjected to research because the population is less than 30. In identifying the problems faced by farmers in the Kuri Caddi sub-village, a qualitative descriptive analysis of internal and external factors is used.

2.1. Internal and external factor analysis

Table 1. Internal Factor Evaluation (IFE) matrix

Main internal factors	Weight	Ranking	Weight scores
Straightness			
1. Xx	Xx	Xx	Xx
2. Xx	Xx	Xx	Xx
Weakness			
1. Xx	Xx	Xx	Xx
2. Xx	Xx	Xx	Xx
Total			

Table 2. *External Factor Evaluation* (EFE) matrix

Main internal factors	Weight	Ranking	Weight scores
Opportunities			
1. Xx	Xx	Xx	Xx
2. Xx	Xx	Xx	Xx
Threats			
1. Xx	Xx	Xx	Xx
2. Xx	Xx	Xx	Xx
Total			

Where:
1. Giving weights that range from 0.0 (not important) to 1.0 (very important).
2. Ranking for these factors is very weak (rank = 1), weak (rank = 2), strong (rank = 3), or very strong (rank = 4).
3. Obtaining a score is done by multiplying each factor's weight by its ranking to determine the weight score for each variable.

3. Results and discussion

3.1. Farmer characteristics

As many as 95.7% of lowland rice farmers in Kuri Caddi are at a productive age, while 4.3% are unproductive (> 65 years). As many as 74% of farmers have an elementary school education (which is the most), 8.7% have a junior high school education, and 17.3% of farmers have never attended school. The experience of rice farming also varies from 3-40 years, with an average of 20 years. The number of dependents ranges from 3-6 people, with an average of 5 people. The average area of land owned by farmers is 0.52 Ha.

3.2. Identification of internal factors of coastal rice farming

3.2.1. Strength factor. There are four strengths identified in this study, namely human labor availability, land propriety for rice farming, farming experience, and age of productive farmers.

a. Human labor availability

Labor is an important factor in family farming (family members as farmer labors). The role is crucial because when family labor can still handle the farm, there is no need to hire workers, which means cost saving. Farmers in Kuri Caddi Hamlet still use the family labor system and even still use the cooperation system where they help each other.

b. Land propriety for rice farming

Natural conditions in coastal areas in general often face a high pH and salt content problem. However, as explained by the head of RT 3 as well as the Chairman of the Farmers Group in Kuri Caddi Hamlet, the water in the hamlet is brackish, the salt content is not too high. Besides, Kuri Caddi Hamlet is also free from floods; it supports the community to continue doing rice farming. Even though it is located in a coastal area, Kuri Caddi Hamlet has never been flooded because it has an uneven soil structure. If a tide occurs, the seawater will seep up to the paddy field, but only lasts for about 10 minutes and the water will go back to the sea. So this is an advantage for farmers to continue doing rice farming even though it is in the coastal area.

c. Farming experience

The farming experience of farmers can determine the success or the failure in managing their farm. Farmers already know how to conduct farming. The average farmer in Kuri Caddi Hamlet has more than ten years of rice farming experience. Although some farmers are outsiders, these farmers have done farming before in other areas. So the experience gained during farming in the area can be applied in this hamlet. Farmers only need to be given additional education related to agricultural development.

d. Age of productive farmer

The age of the productive farmer affects the performance in farming activities they manage. Table 3 shows that 95.7% of farmers in the Kuri Caddi Hamlet are ranged 15-64 years and are classified as productive. They are better to manage their farming well because of their stronger physical abilities compared to farmers over 64 years and can receive information and innovation more easily and quickly, especially to develop their farming.

3.2.2. Weakness factor. Besides the strengths, four problems that become the weaknesses were also identified in this study. They are the uncertified seeds, the unbalanced fertilizer, the land processing that is not timely, and the difficulty of farmers to absorb innovations.

a. The uncertified seeds

Seeds are one of the basic inputs that determine success in crop production activities. Farmers in the Kuri Caddi hamlet use varied seeds, namely Ciherang, Pelipin, Celebes, and Inpari. Of the several varieties used, only Inpari is included as certified seed, and only a few farmers use it. Most farmers in Kuri Caddi Hamlet obtain seeds from farmers' harvests in the previous planting season. Usually, they save 1-2 sacks to be used as seeds and this goes on continuously [5]. So that there is no chance to change the variety used, especially if the government seed aid is slow to be distributed. This will certainly affect rice production.

b. The unbalanced fertilizers

The use of unbalanced fertilizers can reduce the productivity and quality of agricultural products. Farmers in Kuri Caddi sub-village mostly use only one type of fertilizer, namely *urea*, so other needs of rice plants are not met. This will certainly affect the rice growth and soil structure that will be damaged.

c. Land processing that is not timely

Working in the rain-fed area, farmers have to do land processing promptly due to uncertain weather conditions. But the farmers in the Kuri Caddi Hamlet have limited equipment which in this case is the tractor. Of the 23 sample farmers, only five farmers owned a tractor, and one tractor belongs to a farmer group. This is what impedes farmers in conducting their businesses, especially those who do not have a tractor because they have to borrow from a relative or neighbor and have to wait until the owner has done used the tractor.

d. Farmers find it difficult to accept innovations

Innovations are required in developing rice farming, especially in technology, whether from the types of varieties, tools, until machinery, and how to grow the rice plant. But in reality, the farmers in Kuri Caddi Hamlet find it difficult to accept innovations given from extension agents. That is due to the distrust of technology and the low level of education the farmers have. So that what is delivered by the instructor does not produce expected results. Such as certified seed and legowo planting systems. Extension agents often conduct counseling related to the legowo planting system in the village, but farmers never apply it because there will be wasted land so that it will reduce production.

Table 3. Internal factors of kuri caddi coastal paddy field farming, nisombalia village

Internal factor	Weight	Ranking	Weight scores
Strengthness			
Human labor is available	0.14	4	0.56
The land is suitable for rice cultivation	0.16	4	0.64
Farm experience	0.11	3	0.33
The age of the farmer is still productive	0.13	3	0.39
Total strength	0.54		1.92
Weakness			
The seeds used are not certified	0.09	2	0.18
Fertilizers used are not balanced	0.10	1	0.1
Land processing that is not timely	0.12	1	0.12
Farmers find it difficult to accept new innovations	0.15	1	0.15

Total weakness	0.46	0.55
Total	1.001	2.47

Based on table 3 above, related to internal strength factors, the highest weight of 0.16 is on land planted by farmers suitable for rice cultivation. The ranking of these factors is higher compared to other factors because they are considered the most influential in rice farming. The total value of strength is 1.92. Whereas in terms of internal weakness, the highest weight of 0.15 is given to farmers who find it difficult to accept innovations with weight values. Giving weight to this factor is higher when compared to other factors because it is considered the most influential in agricultural activities. The more difficult it is for farmers to accept innovation, the more difficult it is to develop rice farming in Kuri Caddi Hamlet so that it will become a major weakness in developing agriculture.

3.3. Identification of external factors of coastal paddy farming

3.3.1. Opportunity factor. There are three opportunity factors identified in this study, namely the creation of new jobs, the availability of farmer groups that can facilitate the entry of aid and a strong cooperation culture.

a. Created new jobs
Coastal communities are known for their low economic conditions. Although in general, they work as fishermen, but it has not been able to meet the daily needs of the community. Fishermen in Kuri Caddi Hamlet generally work to catch crabs (a type of crab). The small crab obtained will be sold for 30 thousand/kg and used to buy daily necessities. Every day the crabs are caught by the community around 1 to 3 kg and sometimes they even get nothing. The capital used to go to sea often does not return, making the community feel disadvantaged. Therefore, with the presence of agricultural land in the area, especially coastal communities who are only farmers can work on rice farming and will increase their income from agricultural products by sharing the profits with their owners.

b. There are farmer groups that can facilitate the entry of assistance
The Pajalayya Farmers Group in Kuri Caddi Hamlet is directed to improve the ability of farmer groups to carry out their functions. One of them is channeling assistance to farmers. The existence of farmer groups will help farmers to get help from the government more easily. Besides that, in terms of the program, the Pajalayya farmer group has a specific schedule for counseling, which is before the planting season and before the harvest season. The activities carried out are to provide counseling about group development, the preparation of the RDKK (Definitive Plan for Group Needs) for fertilizer subsidies as well as the technique of extracting tiles to know yield estimates.

c. The cooperation culture is still strong
Cooperation is a form of cooperation between individuals, between individuals and groups and between groups. In Kuri Caddi, cooperation culture is still very strong, especially in agriculture, such as when planting and harvesting agricultural products, they will help one another. If this culture is maintained, it can be an opportunity for the community to develop their farming because it will affect the low cost of production and can strengthen the kinship of fellow coastal communities.

3.3.2. Threat factor. There are three threat factors identified in this study namely road infrastructure and land transportation equipment are not available, natural disasters (abrasion, tidal floods, tsunamis, etc.), as well as pest and disease attacks.

a. Identification of external factors of coastal paddy farming
To go to Kuri Caddi Hamlet can be reached by two lines, the first is the land route with the road conditions that are so bumpy, rocky, sometimes muddy, muddy, and even some of the roads have to

cross the bridge. The second route is by sea. To use this sea route must pay attention to tidal conditions and the weather at that time because if the weather is in bad condition, then the trip cannot be continued. This is certainly a threat for farmers when they want to buy agricultural inputs such as fertilizers and medicines because they cannot go through these channels so that the process of maintaining plants can be hampered while most coastal communities only have means of transportation for the sea lane.

b. Abrasion, tidal floods, hurricanes, tsunamis, and rising sea levels

Abrasion is a process of erosion of the coast by destructive ocean wave power and ocean currents. As a coastal area, it is certainly very prone to abrasion. Abrasion can cause damage to road infrastructure which is a barrier between the sea and agricultural land in the Kuri Caddi Hamlet. So that the occurrence of abrasion can have a bad impact on agricultural land because seawater will enter the land and will threaten crop failure.

Tidal floods that occur are one of the effects of tidal events. The impact of tidal floods is damage to buildings, groundwater quality changes and land damage. Indonesia's climate has a dry and rainy climate, it has a direct influence on the cropping patterns in Nisombalia Village, especially in the Kuri Caddi Hamlet. Increasingly uncertain weather often makes rice plants become damaged. Even though agriculture in Kuri Caddi Hamlet is rain-fed, when the rainy season is prolonged or continuous, it will make it difficult for farmers to cultivate rice and can even cause tidal floods.

Hurricanes, tsunamis, rising sea levels. Coastal areas are also vulnerable to environmental pressures and natural disasters such as earthquakes, tsunamis, floods, strong winds, and abrasion. As a coastal area that conducts rice farming, it will become a big threat to coastal communities, especially in the Kuri Caddi Hamlet because natural disasters can occur at any time and cause losses such as crop failure, reduced paddy land area and even loss of their livelihoods.

c. Pests and diseases

Rice plants in Kuri Caddi Hamlet are vulnerable to pests and diseases. The pests that attack the Kuri Caddi Hamlet rice plant are witong sangit, leafhoppers, and rats. There was even an opinion from the public that the rat is one of the pests that cannot be overcome because it will become worse. So that the community just let it be. While the disease that attacks rice plants in Caduri Kuri Hamlet is a neck disease or what they usually call "Cekkong". This disease usually causes a panicle empty and even broken.

Table 4. External factors of Kuri Caddi coastal paddy field farming, Nisombalia Village

External factor	Weight	Ranking	Weight scores
Opportunities			
1. The creation of new jobs	0.20	4	0.80
2. Farmer groups are available that can facilitate the entry of assistance	0.17	3	0.51
3. The mutual cooperation culture is still strong	0.15	3	0.45
Total opportunities	0.52		1.76
Threats			
1. Road infrastructure and land transportation equipment that is not available	0.15	2	0.30
2. Natural disasters (abrasion, tidal floods, tsunamis, etc.)	0.13	2	0.26
3. Pests and diseases	0.20	1	0.20
Total threats	0.48		0.76
Total	1.000		2.52

Table 4 above shows that the opportunity is very good in developing lowland rice farming in Kuri Caddi Hamlet, namely the creation of new jobs with a score of 0.8 and a weight of 0.20 and a rating of 4. These factors are given a high weight because they are considered to be very influential on the farming carried out, namely can increase income from the community itself. While the factors that become a threat in the development of lowland rice farming in Kuri Caddi Hamlet which have the highest weight score are pests and diseases with a score of 0.20, a weight of 0.15 and a rating of 1. These factors have the highest weight score because it is one of the threats very difficult to avoid and can make plants die.

Conclusions

Based on the results of this research, it can be concluded that internal factors that influence the development of rice farming in the coastal area of Kuri Caddi Hamlet, Maros Regency are divided into two, namely strengths and weaknesses. The strengths are the availability of human labor, the land suitability for rice cultivation, the farming experience, and the farmers' productive age. The weaknesses are the uncertified seeds, the unbalanced fertilizer, the untimely land processing, and the difficulty of farmers in accepting innovation. While external factors that influence the development of rice farming in the coastal area of Kuri Caddi Hamlet, Maros Regency are divided into two, namely opportunities and threats. The opportunities are the new job making, the availability of farmer groups that can facilitate the entry of a culture of assistance and cooperation, are still strong. The threats are the unavailability of road infrastructure and land transportation, as well as natural disasters, and pests.

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