THE ROLE AND KEY SUCCESS OF AGROFORESTRY (A REVIEW)

(Peran dan Kunci Sukses Agroforestri (Sebuah Tinjauan))

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ABSTRACT

An increase in the population has led to an increase in the need for food, land for cultivation, residential land, and land for industry. One effort to accommodate the community's interests towards the needs of agricultural land is by implementing an agroforestry system. Agroforestry systems are sustainable agricultural systems because of the combination of plants with various types and have several canopy strata that are more environmentally friendly. However, there are still many agroforestry practices that still have low productivity. So that farmers are not interested in developing them. Agroforestry has superior economic, social, and environmental aspects compared to the traditional farming system (monoculture). Agroforestry can succeed if it can increase community income while maintaining land productivity. The success of agroforestry is influenced by: a) selection of the right type of plant, b) maintenance of plants, c) available market, and d) strong farmer institutions..

***Keywords**: Agroforestry, role, land productivity, selection of plant species*

ABSTRAK

Peningkatan jumlah penduduk menyebabkan peningkatan kebutuhan akan pangan, lahan untuk bercocok tanam, lahan pemukiman, dan lahan untuk industri. Salah satu upaya untuk mengakomodir kepentingan masyarakat terhadap kebutuhan lahan pertanian adalah dengan menerapkan sistem agroforestri. Sistem agroforestri merupakan sistem pertanian berkelanjutan karena kombinasi tanaman dengan berbagai jenis dan memiliki beberapa strata tajuk yang lebih ramah lingkungan. Namun, masih banyak praktik agroforestri yang masih memiliki produktivitas rendah. Sehingga petani tidak tertarik untuk mengembangkannya. Agroforestri memiliki beberapa karakteristik yang lebih unggul dibandingkan dengan sistem pertanian tradisional (monokultur) dalam aspek ekonomi, sosial, dan lingkungan. Agroforestri dapat berhasil jika dapat meningkatkan pendapatan masyarakat dengan tetap menjaga produktivitas lahan. Keberhasilan agroforestri dipengaruhi oleh: a) pemilihan jenis tanaman yang tepat, b) pemeliharaan tanaman, c) pasar yang tersedia, dan d) kelembagaan petani yang kuat.

Kata kunci: Agroforestri, peran, produktivitas lahan, pemilihan jenis tanaman

I. INTRODUCTION

Indonesia is still facing problems in meeting food needs. Every government always strives to achieve food self-sufficiency. However, these efforts faced some obstacles because of the decreasing area of agricultural land, especially on Java island. Badan Pusat Statistik (2018) reports that the paddy field area from 2012-2015 has decreased by 39.871 hectares. In general, paddy fields are converted into settlements, industrial estates, and public facilities. Efforts to increase the area of paddy fields through the development of new rice fields are not proportional compared to the conversion rate. One of the obstacles faced in expanding paddy fields outside Java is low soil fertility which requires high production inputs (Hikmatullah et al., 2002).

Suryana (2014) states that the challenge of achieving food self-sufficiency is the existence of competition for the use of natural resources with other sectors, global climate change due to the expansion of agricultural land, and the subsistence economic value of farming. One effort to expand agricultural land is by utilizing forest land both owned by the state and community forests. The planting of annual crops among woody plants is known as agroforestry. Purnomo et al. (2016) said that the concept of agroforestry tried to incorporate a system of natural diversity into a monoculture system with more stable and productive results but environmentally friendly.

Mayrowani (2011) mentions that forests can directly function as a buffer of life and directly as food providers. Agroforestry as a life buffer is one of them capable of storing large amounts of carbon. Cardamom agroforestry with timber plants can store carbon 13 times higher than ordinary farming systems (Rita Sharma; Jiancu Xu & G. Sharma, 2007). Forests as food providers need to be supported by the proper technology. Varieties of shade-resistant food crops need to be developed so that agroforestry systems still provide high commodity productivity (Widodo, 2015).

The government, in this case, the Ministry of Environment and Forestry and the Ministry of Agriculture, continues to encourage efforts to expand agricultural land on dry land. The Ministry of Environment and Forestry has issued Regulation of the Minister of Environment and Forestry number P.12/Menlhk-II/2015 concerning the development of Industrial Plantation Forests (HTI), which regulates the existence of food crops with agroforestry patterns that aim to increase production and diversity of forest products and empowerment community around the forest. Therefore, a high potential area of land owned by HTI can contribute to the fulfillment of national food. Perum Perhutani, as a state-owned forest company (BUMN) in Java, develops a program of Social Forestry (SF). This program provides an opportunity for communities around the forest to utilize forest land with agroforestry patterns which are mainly planted with types of food crops, such as dry land paddy, corn, peanut, etc.

Hidayat (2007) states that the benefits obtained from developing food crops on dry land such as forest land are: 1) functioning as pioneer plants to suppress weeds/reeds growth, 2) not too intensive land preparation, 3) organic matter from the rest of the harvest is easily returned to the ground, 4) lower production costs, 5) do not require special facilities such as irrigation.

Agroforestry as a support system for food self-sufficiency needs to be widely developed. Combining the forestry and agriculture sectors is expected to maintain the ecosystem's sustainability and the food supply's sustainability. The contribution of agroforestry to ecological or environmental aspects can be divided into several sub-aspects, including hydrology (water management), conservation, biodiversity, and soil fertility. This paper will explain the contribution of agroforestry in the environmental and socio-economic aspects. Finally, this paper will suggest the requirement for the success of agroforestry development.

II. METHOD

The method used in this paper is a literature study or review of various research results related to the contribution of agroforestry and the key to success in the application of agroforestry. The data obtained are sourced from journals, proceedings, books, thesis, and other document sources. After screening by reading the abstract and the article's contents, articles related to the research topic were found. Data analysis was done descriptively.

III. ROLE OF AGROFORESTRY

The role of agroforestry can be divided at least into two aspects, namely environmental and socio-economic. Each aspect will be discussed one by one as follows.

A. Environmental Aspect

The role of agroforestry in environmental aspects is related to hydrological and conservation functions. The hydrological function is related to the function of the forest and its canopy as one of the important holders in the water cycle. According to Noordwijk et al. (2004) the effect of tree cover in agroforestry on water flow is in the form of interception, water infiltration, water uptake, and landscape drainage. Rainfall interception by heterogeneous vegetation and multilayers causes a reduction in the energy of kinetic grains so that the dispersion power of soil aggregates decreases. This is important because vegetation will form from annual crops or forestry. In addition, the influence of interception can reduce the rate of reception at the ground level due to the flow of streams (streamflow) and canopy (throughfall).

The infiltration process depends on the soil structure in the surface layer and various layers in the soil profile. Biota activity also influences the soil structure, whose energy sources depend on organic matter (surface litter, organic exudation by roots, and dead roots). The availability of food for biota (especially worms) is important to anticipate the decay and blockage of the macropores of the soil (Rauf, 2004).

The presence of litter on the ground surface is accompanied by changes in soil porosity due to the development of the root system's increased capacity and rate of filtration. This condition increases soil moisture and also reduces the volume and flow rate (direct runoff). The effect of this system on the water system, dominant in the delayed flow, and this effect is evident after being reached after the soil surface is covered with a plant canopy (Noordwijk et al., 2004).

Furthermore, Handayani & Widiyanto (2013) said that soil organic matter content changes under agroforestry influence the soil infiltration capacity. The higher the content of organic matter, the higher the infiltration capacity. The highest infiltration capacity was found in *manglid* (*Magnolia champaca*) monoculture, followed by agroforestry *manglid* - peanuts, and finally agroforestry *manglid* - corn.

The plants absorb water from various soil layers throughout the year to support the transpiration process on the leaf surface. Factors that influence the amount of water uptake by trees are tree phenology, root distribution, and the physiological response of trees to partial water stress. Water uptake by trees between the events of rain will affect the amount of water that can be stored from the next rain event so that it will further affect the infiltration process and surface flow. Water uptake in the dry season, especially from the lower soil layers, will affect the amount of water available for slow flow (Noordwijk et al., 2004).

The amount of drainage in a landscape is influenced by several factors. These factors include soil surface roughness, ground surface relief which allows water to stay on the ground longer to encourage infiltration, and the type of channel formed by surface flow which can lead to the rapid flow of water. Thus, in a well-managed agroforestry system, the function of forests as recipients, depositors, distributors, and releasers can run well. The possibility of soil erosion can also be reduced by reducing sediment yields while other water yields increase with relative regimens the same all the time. Gopinathan & Sreedharan (1989) examined six types of agroforestry and concluded that planting eucalyptus-cassava following contours had a better effect on erosion control than eucalyptus monoculture and eucalyptus-cassava, which were randomly planted.

In general, the benefits of the agroforestry model in conservation and biodiversity include conserving forest plant genetic resources. Species richness in agroforestry areas is usually very high. Agroforestry, which is located near natural forests, has a diverse component of forest plant species. In the agroforestry area in Krui, Lampung, and Maninjau, West Sumatra, there are 300 species of plants. Many plants need more light in agroforestry such as jackfruit, breadfruit, pulai, and bayur (Bismark & Sawitri, 2006).

Village communities in Mount Halimun, West Java, use forest plants to use buildings, food sources, traditional medicines, fuelwood, animal feed, and traditional ceremonies of 464 species (Harada et al., 2001 in Bismark & Sawitri, 2006). Agroforestry arranged with high species diversity and good canopy composition can be a habitat for several species of animals, such as primates, bears, and terrestrial mammals. The role of these animals can be as spreaders of grains that help the regeneration process and increase plant diversity. The number of mammal species found is 33 species in durian agroforestry, 39 in rubber forest, and 46 in damar agroforestry with protected species are 14, 15, and 17 species, respectively (Michon, 2000).

A typical environmental problem related to land is the expansion of critical land and high soil erosion rates. Canopy stratification systems that resemble forests in terms of soil and water conservation will have more impact on regulating water systems and indirect rain into the soil, preventing surface erosion. This can be seen from the composition of species and cropping patterns, types of trees in the fields, and community forests. For example, the role of trees in water infiltration such as *Calliandra callothyrsus* can increase 56% of water infiltration, *Parkia javanica* 63.9%, and *Dalbergia latifolia* 73.3% (Pudjiharta, 1990 in Bismark & Sawitri, 2006).

Another benefit of the existence of trees in the environment is the occurrence of an efficient nutrient cycle to support land productivity through fertilization by the development of soil microbes. The availability of concentrations of organic matter, C, and soil N from the litter will affect the microbial biomass of the soil, including *mycorrhiza,* which actively absorbs and provides microelements P, N, Zn, Cu, and S to host plants so that the nutrient cycle in agroforestry is efficient and closed.

Litter and pruning in the agroforestry system provide a positive nutrient balance (C, N, and P). Conversely, without littering, it results in a deficit of soil nutrients in the monoculture farming system (Sudomo & Widiyanto, 2017; Handayani & Widiyanto, 2018). When compared to controls, the existence of *sengon* pruning in *sengon*-peanut agroforestry systems gave a positive balance of C, N, and P in a row of +0.41 tons/ha, +0.09 tons/ha, and +0.25 tons/ha (Handayani & Widiyanto, 2018).

The diversity of plants cultivated between trees and crops allows a longer food and energy chain. This condition will further support the creation of high biodiversity. The diversity of plant species in agroforestry was stated by Winara and Suhaendah (2016), which said that *manglid* agroforestry patterns in Tasikmalaya were composed of 20 species of plants (16 families) dominated by *manglid* and tea. Meanwhile, Wijayanto & Hartoyo (2015) explained that the components of the Repong *damar* agroforestry plant species in Krui, Lampung were dominated by *damar mata kucing* trees (*Shorea javanica*), while mixed gardens in West Java were dominated by mangosteen fruit trees (*Garcinia mangostana*).

Sharma & Vetaas (2015), who examined farmland agroforest in the Central Himalayan highlands, found that there were still many tree species on community farms in this region. There are around 183 tree species in the study area which are dominated by *puspa* (*Schima wallichii*) and Pine (*Pinus roxburgii, Pinus wallichii*) and fruit-producing trees namely *berangan* (*Castanopsis indica*). CIFOR (2003) also mentions that agroforestry systems provide a growing place for several species of birds and bees.

B. Socio-Economic Aspect

Several studies have shown that agroforestry provides economic contributions to the farmers. This contribution is in the form of short-term income from seasonal and annual crops and medium and long-term income from timber. The measurement of economic contribution is mostly in agroforestry in state forests, especially in production forests. For instance, the total economic value of Industrial Plantation Forest (HTI) development with SF pattern was estimated at IDR 3,076 trillion. Total economic value has provided positive benefits in the balance of regional economic increase, improved the public welfare, efficient and competitive land management, and achievement of forest management which is environmentally friendly and sustainable (Maryadi, 2011)

Meanwhile, mahogany-vanilla agroforestry produces an NPV of IDR 19,348,796/ha from the activities of social forestry. The largest BCR is 3,29, and IRR of 104,76%. The sensitivity analysis showed that the agroforestry business of mahogany trees and coffee was not feasible to be carried out when the production costs increased, and production prices decreased by 10% on the interest rate of 18% and additional management fee of 20%. Overall, the implementation of the SF partnership has increased vanilla farmers income and better-preserved forest environment indicated by a decrease in illegal logging (Rachmawati, 2008)

Research from Girsang (2006) shows that the benefits of agroforestry for the farmer in Sekaran Village is IDR 11,815.625/year for strata III, IDR 8,092,167/year for strata II, and IDR 7,753.125/year for strata I. While in Plajan Village, benefits from forest resources for strata III it is IDR 6,735,000/year, strata II is IDR 5,655.882/year, and strata I is IDR 3,970,000/year. Strata I are households with land > 0.5 ha, strata II 0.25-0.5 ha, and strata III < 0.25 ha.

The agroforestry pattern applied in Sukagalih Village is divided into two patterns. Pattern I combines *sengon* with carrots throughout the year, while pattern II combines *sengon* and vegetable crops such as carrots, *caisim*, and beans in rotation within one year. The results showed that for pattern I, the NPV value was IDR 13 416 760, the IRR was 38%, and the Net B/C was 3.42. As for pattern II, the NPV value obtained is IDR 10 594 816, IRR is 37%, and Net B/C is 3.30. However, based on the comparison of production and acceptance of the two types of cropping patterns, it can be concluded that the average productivity and annual revenue value of agroforestry pattern II are greater than that of agroforestry pattern I. It indicates that the planting pattern of *sengon* wood agroforestry with a variety of vegetable crops in the rotation is more profitable, compared to the planting pattern of *sengon* wood agroforestry with one type of vegetable constantly within one year with a total difference between the two patterns of 53.84% or Rp 5 183 568 (Maulida, 2015).

Armas et al. (2020) measure the resilience level of agroforestry farmers with several patterns and staple crops. The results of the study show that the highest level of resilience is the candlenut dominant agroforestry pattern with a total score of 1,738, the moderate level of resilience in the acacia dominant agroforestry pattern with a total score of 1,596, and the lowest agroforestry level in the teak dominant agroforestry pattern with a total score of 1,572. Meanwhile, Widianingsih (2006) said that the average annual income of households participating in the coffee agroforestry program under tree stands at strata I was IDR 78,372,815 (12.49% of total income), the second strata is IDR 4,249,058 (52.72% of the total income), and in the third strata is IDR 1,055,000 (100% of total income).

Social forestry activities, especially in state forests, show the involvement and participation of the community in the decision-making process regarding forest management. According to Siswiyanti & Ginting (2006) research, since participants' role in the policy process was not equal, community participation was still very low, especially in the decision-making process. Some kinds of government dominance (represented by state forest companies and local government) were found, so a more democratic and fair policy has not been reached. Kusdamayanti (2008) added that farmers participation in planning, implementing, and evaluating forest conservation as well as in using the forest products were low,

But according to Rakhmadi (2014)**,** the level of perception, motivation, and participation of society can be counted as high. The level perception is 73.33%, which is generally affected by internal factors, including the need for life. The voluntary activities generally influence the level of motivation of 83.33%. The level of participation of 43.33% largely exists on the level of implementation, are affected by the activities of the meeting of the implementation activities and socialization of SF.

Adiba *et al*. (2017) stated that the strongest motivation to encourage farmers to engage in SF activities was ecological motivation. This proves that a strong reason for forest farmers to participate in agroforestry activities in state forests is to protect and maintain forest sustainability, preserve nature, water management, soil fertility, and air cleanliness. Other motivations that encourage are socio-cultural motivation and economic motivation. The motivation of farmers in Warnasari Village is mostly in the high category (67.86%). There is a positive relationship between the role of the forest farmer group (KTH) and farmer motivation; this means that the role of KTH can increase farmer motivation.

Sumardiani (2008) said that the community supports social forestry activities with agroforestry in the utilization area of Mount Gede Pangrango. It showed that 90% of respondents agreed with the SF. Stakeholders have supported this program because this program gave many advantages to increasing society's knowledge and skill. The appropriate SF model is based on stakeholders' aspirations. Society is an initiator and manager, and Gunung Gede Pangrango National Park (TNGP) is the facilitator.

IV. KEY TO SUCCESS OF AGROFORESTRY

Factors that influence the success of agroforestry are species suitability, socio-cultural and economic (Butarbutar, 2009). Shapiro & Rosenquist (2004) stated that agroforestry can be successful and accepted by the community if: a) developing under-crops (annual crops) types that have high economic value, b) cooperation of all parties, c) policies that support small farmers, d) maintaining land productivity, e) environmentally friendly farming system by implementing integrated pest control.

A. Selection of Agroforestry Plant Types

The choice of agroforestry patterns is one of the determinant factors of the success and sustainability of agroforestry activities. Types developed in agroforestry are always more than one type. This type of diversity is an advantage of agroforestry systems. Suprianto (2005) proposes 9 criteria for selecting commodities that are expected to have a comparative advantage in the form of product uniqueness, namely: a) having a domestic market and better-having export opportunities, b) based on local resources, c) supporting human resources, both quality, and quantity, d.) Having financial feasibility so that it can grow and develop as a source of revenue, e.) having technical feasibility, f) having multiplier effects characterized by the ability to generate business diversity, g) having ecological feasibility so that it does not interfere the sustainability, h) having no conflict with the customs (*adat-istiadat*) of the local community, and i) supported by adequate facilities and infrastructure.

Annual crops can be planted at the beginning of the growing season for wood with an intercropping pattern. Intercropping plants (crops) should be planted immediately after finishing wood planting so that weeds have not grown much. The objectives of intercropping are: a) minimizing maintenance costs, b) producing intermediate products, c) maintaining plants better, and e) better soil management. The types of annual plants used in intercropping should be the type that will not interfere with the growth of the main plant. The potential of intercropping to produce food crops is quite large.

Dwiprabowo *et al.* (2011) stated that the yield of rice, corn, soybeans, and cassava in a year from the forest area of the Sukabumi KPH area could reach 12,732 tons, 3,889 tons, 2,363 tons, 6,570 tons, 21,578 tons, respectively. Upland rice obtained from forest land in the Indramayu district's Community Based Forest Management program reach 2.38 ton/ha - 3.54 ton/ha (Wulandari & Kusno, 2016). The development of upland rice is generally carried out at the beginning of planting annual crops to a maximum shade limit of 50%; then, more shade-resistant varieties are needed if the shade is higher (Toha, 2007).

Mulyani and Nursamsi (2017) stated that one of the efforts to achieve sustainable food self-sufficiency was to develop rice, corn, and shade-resistant soybean varieties. With the presence of shade-resistant food crop varieties, it is expected that food crops in agroforestry patterns are not only in the initial 2-3 years of forestry plants. However, when the tree's shade has begun to close, the crops can still be planted with high productivity. Soybean varieties Dena 1, Dena 2, and K-13 are varieties that hold the shade up to an intensity of 50% (Sundari & Wahyuningsih, 2017). Upland rice Situ Bagendit varieties can produce 2,957 tons/ha when planted among cashew plants (Pranowo & Purwanto, 2011).

The selection of crop species in agroforestry patterns is not only from the types of short-lived food crops. Farmers can also determine the combination of agroforestry plants to be medium-term but have high economic value. Under shade-tolerant plants that have high economic value are presented in Table 1.

Table 1. Types of high-value shade-tolerant plants

No	Crops	Types of shade plants	Sunlight Intensity (%)
1.	Cacao	Coconut, *gamal, kapok, petai*, rubber, oil palm, areca nut, *sengon*, teak, mahogany	70-80
2.	Coffee	*Lamtoro, sengon, dadap, pete, jengkol*, breadfruit	50-65
3.	Pepper	*Gamal, dadap cangkring*	50-75
4.	Vanilla	*Gamal*	51-55
5.	Cardamom	*Sengon, Jabon*, Mahogany	30-70

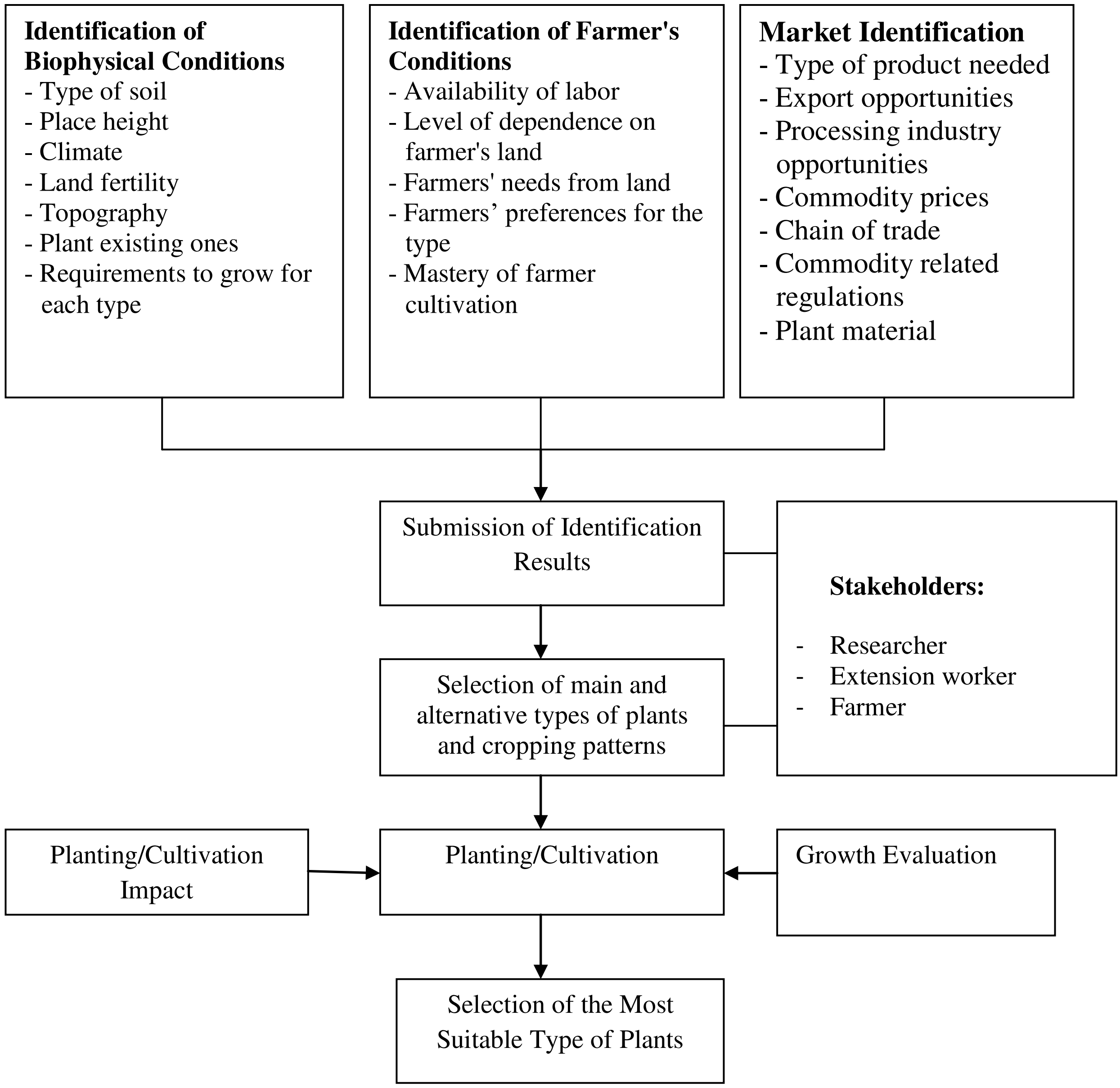

Figure 1. Process for determining the types of agroforestry plants

Nadeak *et al.* (2014) stated that the combination of cocoa, coconut, and banana plants could provide NPV values of IDR 71,392,802/ha with a B/C ratio of 7.39 and IRR 96. Multi strata coffee cultivation will provide positive income in the 4th year with manpower needs of 107 people/hectare/year. It is better compared to the monoculture coffee plantation that provides positive economic value in the 5th year and requires more labor, about 120-184 people/hectare/ year (Budidarsono & Wijaya, 2004). Pepper grown with agarwood can provide high potential profits with IRR values up to 49.3% and a B/C ratio of 8.54 (Nuraida & Mulyani, 2018). Cardamom, an under shade (sunlight tolerant) plant, is now a favorite plant for the community. This type can grow in the shade up to 70% so that the tree canopy almost closes tightly. BCR values and cardamom and *sengon* agroforestry IRR in Wonosobo area can reach 2.32 and 35% (Kusumedi & Jariyah, 2010).

B. Maintenance

Another important factor in the success of agroforestry is maintenance. Maintenance aims to increase the productivity of agroforestry products. High agroforestry productivity can be achieved by managing competition between types of constituents. The competition that occurs in agroforestry systems is in obtaining light and nutrition. Shade trees in coffee and cocoa agroforestry function as a) reducing extreme air and soil temperatures, c) maintaining air humidity and soil moisture, and d) maintaining and increasing soil fertility by reducing erosion. Coffee shade trees can reduce air temperatures by 5° C compared to coffee monoculture (Siles et al., 2010). Tree shade also can reduce excessive light intensity, which can cause drought in coffee plants or excessive vegetative growth in cocoa plants (Beer et al., 1998).

Some management actions in agroforestry systems include Huxley (1999): a). Eliminate dead branches and branches affected by disease and improve wood quality, b). Manipulate canopy size and shape to maintain biomass productivity and maintain competition with under-crops, c). Pruning/thinning selection in addition to maintaining production such as fruit, leaves, branches for firewood, and so on, d). Pruning roots to reduce competition in nutrient extraction. The practice can be making boundary trenches between wood and crops that also function as waterways. Pruning can benefit wood as well as under-crops. Hamid (2008) states that *sengon* trees which are cut to 75% will increase the growth of *sengon* plants while increasing the productivity of crops. Litter leaves also function to restore soil nutrients. Prawoto (2008) states that litter of *waru gunung* leaves can restore macronutrients by 387.86 g/hectare/year, *lamtoro* 274.34 g/hectare/year, *sengon solomon* 272.10 g/hectare/year, teak 244.26 g/hectare/year, *mindi* 208.44 g/hectare/year and *sengon laut* 128.23 g/hectare/year.

C. Market and Marketing

The market is one of the important components in the development of agroforestry. The market is closely related to the income earned by farmers. The market is expected to be easily accessible by farmers and able to accommodate all farmers' products, both raw and processed. Efficient marketing is also needed so that the margins obtained by farmers are profitable for them. For that, a good market and marketing institution is needed. The length of the marketing chain sometimes does not guarantee the market share received by farmers. The results of the marketing efficiency analysis were conducted by Pratiwi et al. (2019), who analyzed three coffee marketing channels. The results showed that although the three marketing channels were efficient with EP value < 1, in general, coffee marketing on the three channels tended not to be efficient. The marketing cost indicates this and profit margins are quite high, the profit margin ratio is not evenly spread, and the share received by farmers is low. Several strategies in market development and marketing include: a) quantity assurance and product quality improvement; b) strengthening of marketing information; c) improving the quality of human resources of farmers; d) providing business capital assistance; e) increased promotional activities; and f) an easy and fast permit management system (Salaka et al., 2012).

D. Farmer Institution

To be able to support all farmer activities in SF activities through agroforestry, strong institutions are needed. Especially if agroforestry is carried out in state forests, which involves more parties. According to Ruhimat (2016), the key factors in developing agroforestry institutions are policy support, availability of technology packages, and optimizing stakeholder involvement. Another key factor is leadership (Diniyati & Achmad, 2013). Farmer groups must be able to act as a medium for farmers to carry out their activities. If it can play a role, then many benefits will be obtained by its members. Among other things, members can exchange farming experience and work skills in managing the land. In addition, the institutional role of farmer groups can be able to handle communication with other parties (Nikoyan et al., 2020). So that farmer groups as an institution also have benefits and roles in improving the economics of the members and maintaining the function of forest to remain sustainable.

V. CONCLUSION

Agroforestry as a form of land management has the potential as a sustainable agricultural system. Agroforestry is expected to bridge ecological and social-economic interests. Agroforestry can have a more positive environmental impact than a monoculture system. The sustainability of production with the variety of products obtained by farmers will provide more continuous income. Agroforestry increasingly contributes to meeting food needs by developing shade-resistant food crop varieties and as part of forest and plantation development. The key successes in agroforestry development are plant selection, plant maintenance, market and marketing, and farmer institution.

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