

# Communicating the springs and forest preservation in the Arjuna mount area, Indonesia

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*by Yustinus Budi Hermanto*

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## **Communicating the springs and forest preservation in the Arjuna mount area, Indonesia**

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**Abstract** The study's goals were to determine the impact of community empowerment for the springs and forest preservation in the Arjuna mount area from the environmental communication perspective. The quantitative descriptive research method was used, with the study population covered communities around the forest and springs that were domiciled in three villages, namely Leduk, Jatiarjo, Dayurejo Villages, Pasuruan-East Java, Indonesia. Data was gathered from respondents with a questionnaire and analysed using SEM (structural equation modelling) to find an overview of respondents' responses about community participation in preserving the Arjuna mount forest. Human resources around the forest, namely the level of education and employment, contribute to the success of revegetation of forests; family economic conditions such as personal and family income, ownership of fields and rice fields for business, and livestock and fisheries businesses assist successful forest revegetation; social characteristics of the community around the forest such as cooperation and kinship between community members contribute to forest revegetation; community institutions, namely forest village community institutions, are a vehicle for the community to revegetate forests successfully; the availability of village community facilities and infrastructures such as paved road access, transportation and communication networks, education and health facilities contribute to the successful revegetation of Arjuna mount forest.

**Keywords:** community empowerment; forest rehabilitation; springs preservation.

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## INTRODUCTION

Environmental issues that occur today are increasingly damaging nature in tourist areas, such as forest fires, landfilling of mangroves, and marine pollution (Hansen, 1991, 2018; Tan et al., 2019). Because cleanliness is a tourist attraction, maintaining cleanliness is very important for the long-term sustainability of tourism (Violina & Suryawan, 2016). Furthermore, visitor satisfaction also affects the development of the tourism sector (Marcelina et al., 2018; Pacoma, 2019). One type of tourism is nature tourism which presents a variety of plant vegetation. Plant vegetation has an essential function in forest conservation because it can regulate the hydrological system, especially the ability of plants to absorb rainwater, regulate water flow, prevent flooding, and maintain water sources in the dry season. The functions and benefits of hydrological forests are lost when vegetation in the higher watersheds is damaged. In tropical forest areas, 90% of farmers living in the lowlands rely on the activities of a small number of farmers living in upstream areas located in the highlands. For example, the Ganges watershed in India, a Himalayan highland region with a population of 40 million, affects the lives of 500 million people in the lowlands (MacKinnon et al., 1986).

As a function of the hydrological system, forest sustainability is critical, especially the effect of a sponge that can hold rainwater and regulate its drainage. Good forest conditions can lead to reduced flooding and good water flow during the dry season. However, decreasing agricultural land, increasing population living around forests, changing the management of protected forests into production forests and tourist destinations, expanding industrial investment areas, and increasing community needs have led to the illegal extraction of forest resources such as water, flora, and fauna controlled by human activities (Liu et al., 2020).

The 2005 FRA (forest research assessment) study categorises various causes of forest destruction, including forest fires, forest pests and diseases, and other factors (human, nature, and animals) (Al Zoughbi, 2006). As an overview, Indonesia's forest ecosystem has been damaged since 1950. Forest damage continued to increase after the Law on Foreign Capital Companies and Domestic Capital Companies issuance in the 1970s when forest exploitation began as a source of national wealth and foreign exchange development. Damage to forest resources is getting out of control when illegal logging, over cutting, encroachment of forest land for agriculture, and forest fires occur. The damage to forest resources is worsening when entering the current era of reform and regional autonomy (Agustina et al., 2020; Liu et al., 2020; Miyamoto, 2020; Oldenman, 1994; Wahyuni & Haryadi, 2020).

The results of USAID monitoring over the last 20 years show that there has been an increase in the rate of forest destruction in Arjuna mount, some sub-watershed areas have decreased spring discharge, which is allegedly related to forest destruction in the recharge area, and

this is allegedly related to forest destruction in the recharge area (Nugroho, Riniwati, et al., 2019). As a result, there were 30 dry or dead springs out of a total of 41 springs. Damage to protected forests and production in Arjuna mount was the primary cause of dry springs. In addition, due to fire and illegal logging, thousands of hectares of Arjuna mount forest are in jeopardy. Arjuna Mount's forest area in the Pasuruan Regency area totals 12,000 hectares. In 2012, fires damaged approximately 1,500 hectares; only 300 hectares of the 1,500 hectares burned have been rehabilitated. According to a study conducted by the Clinton Foundation in the United States in 2011-2012, the rate of forest destruction on Arjuna Mount reached 0.24 per cent or 68 ha/year. If this situation persists, it will endanger the clean water supply for nearly 2 million people in Pasuruan Regency, 4.7 thousand hectares of irrigated rice fields, and approximately 500 industries (Wiyono, 2008).

The existence of the community around the forest is a resource component that interacts directly with the forest. The community provides a practical function for the success of forest conservation and saving springs and their biodiversity. So, it is necessary to stage the empowerment of the surrounding community to achieve independence through counselling and training, capacity building, and empowerment (Garjita et al., 2014). Community development around forests, with approaches based on human resource conditions, socio-cultural, economic, community institutional structures, natural resources, environmental tourism, institutional and community capabilities, are appropriate strategies for forest biodiversity conservation (Haque et al., 2016). However, for the time being, environmental issues remain a significant concern that cannot be resolved entirely (Yuliarti & Jatimurti, 2019, Lestari, 2020).

Environmental communication is a branch of rhetorical communication that first appeared in the United States in the 1980s. This study investigates the connection between communication and human nature (Littlejohn & Foss, 2009). Environmental communication must be creatively integrated and managed using various communication methods and channels (Yasir et al., 2020). Individuals or humans can be environmental conservationists or destroyers in environmental communication. However, communication can be one way to influence individual behaviour (Hapsari, 2016; Bakti et al., 2017; Chandrabuwono & Atika, 2019).

To jointly protect the environment in Indonesia, environmental problems necessitate collective awareness. Environmental communication management is required to communicate environmental awareness and concern to the community and industry (Sibinovski et al., 2021; Susilo et al., 2020; Wahyudin, 2017). This goal can be achieved in various ways, one of which is implementing an environmental communication strategy (Meisyanti & Rahmawati, 2021; Sedek, 2021). Communication strategies are suggestions or tactics that

can be used in communication planning (Ahmed et al., 2020; Rumble et al., 2020)

Communication strategy directs communication planning and communication management to achieve objectives (Astuti et al., 2017). Communication strategy is the best combination of all communication elements, including communicator, message, receiver channel, and influence, that is intended to achieve optimal communication goals (Frianda et al., 2018; Rumble et al., 2020).

The research objectives were to determine the impact of community empowerment based on some of the facts and problems mentioned above for the springs and forest preservation in the Arjuna mount area. This paper also challenges strategic communication to build the spirit of community well-being as a way of preservation in Environmental Communication.

## METHODOLOGY

Data was taken from the growth of plant species that exist in each area around the spring by recording and photographing parts that characterise the tree species. The next step was to measure water discharge in the dry and rainy seasons, water quality data. The plant species' growth data results will then be analysed for plant density, relative density, frequency, relative frequency, importance value, and diversity index (Indriyanto, 2006).

This research was an associative problem, which was a research question that connects two or more variables. The relationship variable in research was a causal relationship. There were independent or exogenous variables and dependent or endogenous variables. Exogenous variables were selected according to consideration based on empirical conditions, forest revegetation activities and community empowerment around the year forest, the ability of researchers, the availability of supporting theories, and the characteristics of the study area (Supranto, 2004).

Exogenous variables in this research were a) Community empowerment (PM), including human resources (PM1); economics (PM2); social (PM3); local institutions (PM4); facilities and infrastructure (PM5); and b) Geography and land (GT), including land slope (GT1); effective soil depth (GT2)

There were three endogenous variables in this study: 1) RH was a symbol of the Arjuna mount forest revegetation variable, with indicators: plant species (RH1); nurseries (RH2); fertilisation (RH3); planting (RH4); care (RH5); 2) PVH was a symbol of Arjuna mount vegetation and fauna profile variable, with indicators: vegetation stratification (PVH1); bird wealth (PVH2); taxonomy wealth (PVH3); plant density (PVH4); 3) PSA was a symbol for variable conservation of spring water, with indicators: water discharge in the rainy season (PSA1); water discharge in the dry season (PSA2); erosion (PSA3); the economic value of water (PSA4).

The method used was the descriptive method. Meanwhile, based on the techniques and tools used to research, the author used the survey method to obtain facts in the research area in Arjuna mount forest. Data gathered in the field are then processed and analysed using GIS, ArcView 3.3 and Google Earth programs. The study population covered the community around the forest and springs, who lived in three villages: Leduk, Jatiarjo and Dayurejo Village, Pasuruan, East Java-Indonesia. Data obtained from respondents with questionnaires and analysed using SEM (structural equation modelling) to find a general description of respondents' responses about community participation in preserving the Arjuna mount forest.

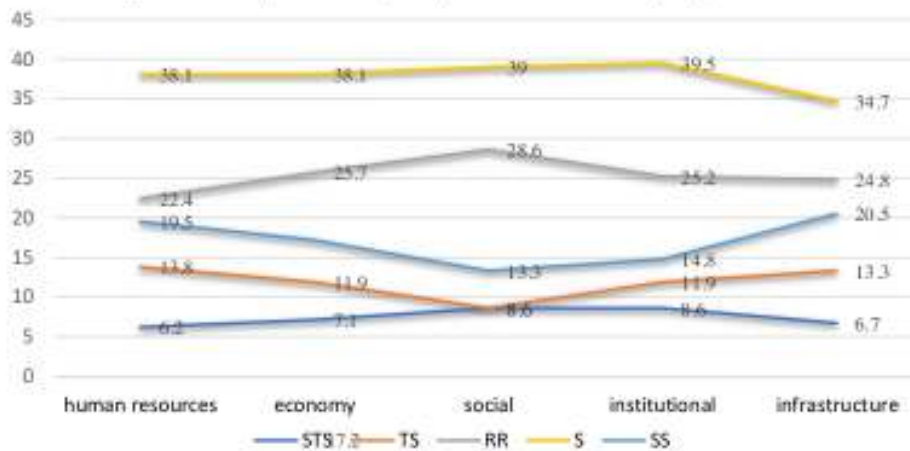
## **RESULTS AND DISCUSSION**

### **Analysis of Human Resource Capital for Community Empowerment**

The profiles of human resource empowerment in the communities of Leduk, Jatiarjo and Dayurejo Villages were: 1) the minimum education level was junior secondary schools; 2) most of the primary source of income was farming; 3) some villagers were breeders and fishermen; 4) some people have side businesses. From the response of 210 respondents to the profile of human resources shown in Figure 1, we can infer that human capital was a determinant of the success of community empowerment for the preservation of the Arjuna mount forest because 57.6% of respondents said they 'strongly agreed' and 'agreed.' Figure 1 describes respondents' perceptions of empowerment in Leduk, Jatiarjo, and Dayurejo Villages.

The human resource constraints associated with community empowerment in Leduk, Jatiarjo, and Dayurejo Villages were the community's level of education as farmers, in general, were junior high school and elementary school. The survey results showed that there were 7 formal education institutions, 10 elementary schools, 4 junior high schools, non-formal, 2 pursuit National High School Equivalency Examination and 3 Islamic boarding schools. There were 361 active members in women's organisations, 178 youth organisations, and professional organisations such as 69 people. Based on these data, the community was conditioned to develop dryland agriculture as the basis of their livelihood, and some did livestock business. The lack of knowledge and skills of the community around the forest has caused people to use the forest as their primary source of income. This has resulted in them doing actions that may cause forest destruction. The level of community education has a significant effect on community empowerment and forest revegetation. Forest conservation education in rural communities has a significant impact on avoiding the destruction of forest ecosystems (Adekola & Mbalisi, 2015).

**Figure 1.** Respondents' perceptions of community empowerment



Note:

STS	:	Strongly Disagree
TS	:	Disagree
RR	:	Doubtful
S	:	Agree
SS	:	Strongly Agree

Source: Data Processing by Author (2021)

The successes in the development of human resources in Leduk, Jatiarjo, and Dayurejo Villages include 1) the formation of a group discussion of communities around the source of water; 2) an environmental school was held once a week, every Sunday by the Cempaka Foundation; 3) livestock skills training activities and 4) tourism service business development, the Arjuna mount forest area has high tourism potential.

Based on the results of surveys and socialisation in group discussions, the two objectives to be implemented in human resource empowerment in Leduk, Jatiarjo, and Dayurejo Villages were: (1) increasing knowledge and changing attitudes of the community toward the Arjuna Mount Forest Revegetation Movement and (2) the environmental school model, which implements education on forest conservation and biodiversity through a local competency-based curriculum by the Cempaka foundation. According to Dewi (2017), knowledge can be influenced by formal education factors. Therefore, knowledge is very closely related to education. Thus, it is expected that with higher education, then one will be more knowledgeable.

### Analysis of Economic Capital for Community Empowerment

The economic profiles of community empowerment in Leduk, Jatiarjo and Dayurejo villages are: 1) rural communities have yards/fields for agricultural businesses; 2) the average income of the

community every month is at least 2 million rupiahs or more; 3) the number of dependents in one family is at least three people (wife, children, parents); 4) most people who have jobs and businesses have savings or assets; and 5) most of the villagers in Leduk or Jatiarjo and Dayurejo have family farms (such as chickens, goats or cows). Furthermore, the perception of 210 respondents on the economic profile of community empowerment in Leduk, Jatiarjo and Dayurejo villages presented in Figure 1 shows that 55.3% of respondents 'agree' and 'strongly agree' on community economic empowerment.

The economic condition constraint related to community empowerment in Leduk Village, Jatiarjo, and Dayurejo is the increasing economic pressure and family needs that impact changing the function of the forest into agricultural land. Seeing these natural conditions, the people of Leduk, Jatiarjo and Dayurejo villages are conditioned to develop dryland agriculture as their livelihood base. In its development, most of the community's agricultural land that has been sold to people outside the area has made them encroach on the forest as agricultural land. The economic limitations of the people living around the forest and the lack of awareness of the dangers of land clearing make them plant seasonal crops to meet their daily needs. Weak enforcement of forest use regulations makes the community jointly and in large numbers clear land in the forest (Wiyono, 2008).

Successes in economic empowerment in Leduk Village, Jatiarjo, as well as Dayurejo, include: 1) increasing the economic value of families through organic farming, goat farming, wasp honey and tourism services around the Arjuna mountain forest to meet the economic needs of the community; 2) village community institutions carry out effective forest conservation based on ecological, economic, and social aspects; and 3) community economic empowerment projects such as presidential instructions for disadvantaged villages, infrastructure development programs to support underdeveloped villages, people's business loans, independent community empowerment programs and community empowerment programs. These programs generally have similar approach dimensions, such as revolving capital assistance, infrastructure development assistance, regional institutional development, strengthening and developing business partnerships, and facilitation of mentoring (Nugroho, Soemarno, et al., 2019).

Based on the results of the survey and socialisation in group discussions, the objectives to be implemented in empowering the community's economy in Leduk, Jatiarjo, and Dayurejo villages are: 1) improving the economy of farming families; 2) increasing the work capacity and income of women's groups; 3) development of environmentally sound forest-agriculture, namely the change in the forest management system by the community from a pure agricultural pattern to an intercropping pattern. Furthermore, Suryana (2006) explains that a better family economic income is the fulfilment of the basic living needs of family members.



### **Analysis of Social Capital for Community Empowerment**

The social profile of community empowerment in Leduk, Jatiarjo and Dayurejo villages is 1) there are still cooperation activities in Leduk or Jatiarjo villages, as well as in Dayurejo villages; 2) most residents actively and voluntarily participate in cooperation activities in the community; 3) the culture of social activities such as mutual assistance at funerals, sick people, marriages and calamities still exist; 4) most of the residents are aware of the reforestation program of Mount Arjuna; 5) community leaders (customary leaders, community leaders, hamlet and village heads, environmental heads) actively participate in forest rehabilitation. The perception of 210 respondents on the social profile of community empowerment in the villages of Leduk, Jatiarjo and Dayurejo, in Figure 1 shows that the social capital of the villages of Leduk, Jatiarjo and Dayurejo is a determinant of the success of community empowerment for reforestation of Mount Arjuna forest because almost 52.3% of respondents 'agree' and 'strongly agree.'

A direct survey of the people of Leduk, Jatiarjo and Dayurejo villages found that there are two ethnic groups, namely Madurese and Javanese, so their daily social language uses Madurese and Javanese. Most of the population is Muslim, but some hamlets adhere to the Kejawen belief by adhering to traditional Javanese wisdom. Regional arts that are still developing are the Laro and Gandul tambourines, namely, arts that use Ketipung and Jidor instruments combined with Javanese poetry and Islamic songs. Forms of social capital include human social relations in society, the growth of trust between fellow human beings, obedience to community values, the level of concern among human beings, active involvement in social activities (Widjajanti, 2011).

The constraints of cultural and social conditions related to community empowerment in Leduk Village, Jatiarjo, and Dayurejo are starting to experience a decline in values and norms as well as patterns of social interaction in regulating the daily lives of community members due to the increasing number of surrounding industries that have penetrated several neighbouring villages. Thus, some people who previously lived in farming under the norms of gotong royong, especially women who changed professions as individual factory workers, did not have enough time to contract with the surrounding community.

There needs to be mutual trust between the community and the Indonesian state forest company so that forest management activities run independently without coordination. Adaptation of community-based forest management was also not optimal because of the weak socialisation and exclusive approach. Indonesian state forest company's position was weak because people who have no land use the conditions of the reform era that often use coercion. Therefore, community empowerment requires developing social capital on an ongoing basis, namely improving social relations, trust, and norms. The social relations in question include participation, cooperation, mutual care, and

reciprocity. Trust and norms in social capital were considered essential components because they support existing social relations. In this case, it can be interpreted if there was no trust, then the existing social relations relationship cannot be said as social capital (Anggita, 2013).

The successes in the social empowerment of communities in Leduk, Jatiarjo, and Dayurejo villages include 1) implementing forest resource conservation following the social characteristics of the forest communities; (2) increasing the social capital of forest village communities in accordance with local wisdom. Examples of routinely carried out activities every year were ritual, social activities of thanksgiving, the salvation of the community, and preservation of springs in the villages of Dayurejo, Jatiarjo and Leduk. However, according to Santoso (2007), communities around the forest still maintain elements of social capital such as the types of customs, culture, beliefs, and rituals that were consistently maintained until now. In addition, the village community living around the forest has customary regulations in utilising forest resources. These values or norms are mutually agreed upon and implemented to keep forest resources sustainably, and communities can continue to survive.

Based on the results of surveys and socialisation in group discussions, the objectives to be implemented in community social empowerment in Leduk, Jatiarjo, and Dayurejo Villages were: increasing the active role of community social capital such as social/work networks, level of trust between people, adherence to norms, concern for fellow human beings and families and involved in community social activities in forest village community institutions, and then forest management will be more effective in supporting conservation-based on ecology, economics and social. Fukuyama (2002) explains that social capital was a value of trust that exists in a society.

### **Analysis of Local Institutional Capital for Community Empowerment**

The profile of local institutions for the empowerment of the people of Leduk, Jatiarjo and Dayurejo villages was: 1) the establishment of the forest village community institution in Leduk, Jatiarjo, and Dayurejo villages; 2) the forest village community institution was responsible for revegetation and forest preservation; 3) communities around the forest actively engage in the implementation of forest revegetation programs (planning, financing, organisation, implementation, monitoring and evaluation, and reporting); 4) Forest village community institutions have cooperation with other parties in managing forests (companies, Indonesian state forest company, universities); 5) the forest village community institution in Leduk or Jatiarjo, and Dayurejo villages experience many obstacles in carrying out cooperation for revegetation of forests that hinder the preservation of the Arjuna mount forest. The perception of 210 respondents to the profile of local institutions for the empowerment of the communities of Leduk, Jatiarjo and Dayurejo



villages, in Figure 1 shows that the capital of local institutions, namely the forest village community institution Leduk, Jatiarjo and Dayurejo villages, determines the success of community empowerment for revegetation of Arjuna mount forest because it was almost 54.3% of respondents' agreed' and 'strongly agreed.'

In Leduk, Jatiarjo and Dayurejo there were the forest village community institution, which actively managed 350 ha of forest in the Indonesian state forest company area of Arjuna mount. Forest management of the Leduk village area was carried out by the forest village community institution of Bumi Lestari Mulyorejo, Jatiarjo village area carried out by the forest village community institution of Ngudi Lestari Dayurejo village area was carried out by the forest village community institution of Indrokilo Manunggal. As a legal entity, the forest village community institution has the authority to be able to cooperate between the community and Indonesian state forest company in forest management and preservation so that in its implementation, forest management provisions are outlined in the articles of association and by-laws and have received mutual consent from the community.

The constraints on the condition of forest village community institutions related to community empowerment in Leduk, Jatiarjo, and Dayurejo villages were: 1) the capacity and role of forest village community institutions as forest managers were still not effective; 2) forest village community institutions did not have a more effective forest management program that supports conservation based on ecology, economics and social. Therefore, the role of the forest village community institutions in forest management was critical. It was explained by Darmanto & Weningsih (2014) that forest village community institutions were a community organisation formally incorporated as a place for all citizens to collaborate with the Indonesian state forest company. Therefore, both parties can help each other and work together as both have a great concern for the forest with the principle of partnership, so that strengthening forest village community institutions can support forest village community empowerment.

Some of the successes of forest village community institutions in empowering communities in Leduk, Jatiarjo, and Dayurejo villages include 1) forest village community institutions and the Indonesian state forest company was able to prevent the threat of damage from looting activities by people living around the forest. This strategy is in accordance with the government regulations number 72 of 2007; 2) forest village community institutions have conducted mapping of forest management rights in collaboration with the Indonesian state forest company, which has been legally stipulated in the forest village community institutions articles of association and by-Laws.

Based on the results of surveys and socialisation in group discussions, the objectives to be implemented in the guidelines for developing village forest community institutions for community empowerment in Leduk, Jatiarjo, and Dayurejo Village were: 1)

establishing plans, implementation and monitoring of forest village community institutions performance for community empowerment and revegetation of the Arjuna mountain; 2) evaluating community development programs through forest village organisations/institutions/groups concerning improving the welfare of the people of Leduk, Jatiarjo and Dayurejo villages; 3) strengthening the institutional capacity of forest village community institutions of Bumi Lestari Mulyorejo in Leduk village, forest village community institutions of Ngudi Lestari Jatiarjo and forest village community institutions of Indrokilo Manunggal Dayurejo.

The procedure of forest village community activities in the forest management system with the community, with the achievement of forest village community development targets, namely: a) institutional strengthening and development, b) establishing forest plot planning in the lap of villages around the forest, c) stipulating requirements and indicators for resource management sustainable forest, d) monitoring, evaluation and corrective actions of the potential root causes of existing problems, and e) conducting performance evaluations for the following program (Awang et al., 2008).

### **Analysis of Capital of Facilities and Infrastructure for Community Empowerment**

The profile of facilities and infrastructure for empowering the people of Leduk, Jatiarjo and Dayurejo villages, namely: 1) access to the infrastructure of the entrance roads in Leduk, Jatiarjo, and Dayurejo villages have been paved; 2) village transportation infrastructure such as motorcycle taxis were available; 3) clean water infrastructure was available for communities in Leduk, Jatiarjo, and Dayurejo villages; 4) health infrastructure was available for communities in Leduk, Jatiarjo, and Dayurejo villages; 5) basic education infrastructure such as buildings and supporting facilities for primary schools and buildings and supporting facilities for junior secondary schools was available for the community in Leduk, Jatiarjo, and Dayurejo villages. The perception of 210 respondents to the profile of facilities and infrastructure for the empowerment of the people of Leduk, Jatiarjo and Dayurejo villages, in Figure 1 shows that the infrastructure of Leduk, Jatiarjo and Dayurejo villages was a determinant of the success of community empowerment for the preservation of Arjuna mount forest because almost 55.2% of respondents agreed and strongly agreed.

The constraints on the condition of facilities and infrastructure for empowering communities in Leduk, Jatiarjo, and Dayurejo villages include: 1) places and equipment for improving business skills were not available to the community; 2) technical guidance on business skills were not available to the community; 3) village unit cooperatives that can provide capital assistance to the community were not yet available; and 4) facilities and infrastructure were not available for forest conservation. Land preparation facilities and infrastructure are



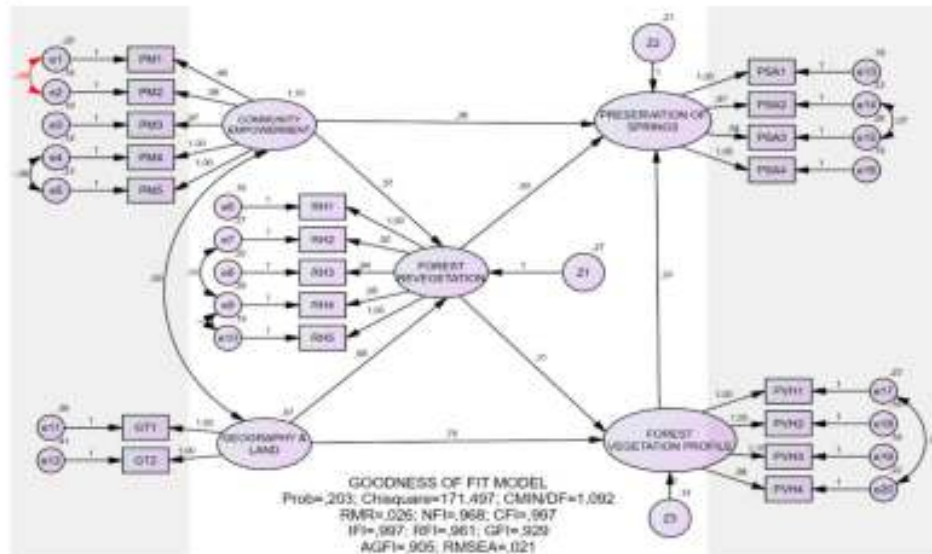
important to spur plant growth, reduce fire risk and minimise erosion, for example, plough and harrow mechanical devices, while chemicals were herbicides for rocky sloping land. Also important are planting facilities and infrastructure such as ploughs, pick-up transporting plant seeds and seedling nursery locations. Weeding facilities and infrastructure mechanically used tractor while manually used hoes, herbicides, and pliers. Fertiliser facilities and infrastructure were hoes, fertilisers, and tanks. Sumodiningrat (1999) explained that providing basic facilities and infrastructure for community empowerment, such as capital, guidance, and equipment for inadequate business skills training, resulted in the community's capacity to develop and independently slow down. Eventually, the empowerment of the community was lost.

Some of the successes that have been carried out regarding facilities and infrastructure for empowering communities in Leduk, Jatiarjo, and Dayurejo villages were the availability of facilities and infrastructure for road access, transportation equipment, clean water, health, and education facilities in Leduk, Jatiarjo, and Dayurejo villages. Hardjohubojo & Budihardjo (1993) states that the facilities and infrastructure that were very important for the feasibility of human life were facilities and infrastructure, which include: 1) social services, such as schools, clinics, health centres, hospitals that the government generally provided; 2) social facilities (social facilities), such as places of worship, meeting houses, sports fields, playgrounds/open spaces, shops, markets, stalls, sidewalks and so on; 3) environmental infrastructure including roads and bridges, clean water, electricity networks, telephone networks, dirty water networks and waste.

Based on the results of surveys and socialisation in group discussions, the target to be implemented regarding the facilities and infrastructure for empowering communities in Leduk, Jatiarjo, and Dayurejo villages was the development of environmental facilities and infrastructure as a form of increasing community empowerment, attention, support, guidance and of course assistance from various related parties, namely the government of Prigen subdistrict and the Leduk, Jatiarjo and Dayurejo villages. Furthermore, if there were problems regarding implementing the community empowerment program, a solution can be found. Therefore, it was good to develop environmental infrastructure as a manifestation of the community empowerment program that needs continuity or sustainability to carry out their daily activities more comfortably. Widjajanti (2011) explains that facilities and infrastructure in the form of facilities and assets such as buildings, roads, tools, machinery, etc., were the main tools and support for the community development process. In the development of forest villages, an essential component in empowering the economic community was developing production and marketing infrastructure (Anandita, 2013). Increasing community income in micro, small, and medium entrepreneurs can be done quickly if infrastructure

development projects supporting underdeveloped villages continuously improve (Harahap, 2012).

According to the regression weights analysis results (structural equation model), Figure 2 shows that the variable community empowerment has a very significant effect on preserving the Arjuna mount forest. The more empowered the community, the better the forest revegetation, and vice versa. Wakarmamu et al. (2015) explained a significant influence of empowerment factors such as profile, institution, economy, and policy on forest rehabilitation productivity. Sustainable community development based on environmentally friendly alternative income-generating approaches was critical in promoting global forest sustainability (Haque et al., 2016). At the same time, Effendi et al. (2014) state that Community empowerment has a positive impact on forest conservation and preventing illegal logging in three ways: 1) increasing income and growing the economy of environmentally sound rural communities; 2) provision of facilities and infrastructure; and 3) creation and positive behaviour in environmental preservation.



Source: Data Processing by Author (2021)

The estimated value of regression weights SEM (structural equation model) for each community empowerment indicator shows that human resources were 0.99, the economy was 0.99, social was 0.97, local institution was 1.00 and facilities and infrastructure were 1.00. This condition explains why respondents believe that local institutions, facilities, and infrastructure play a more significant role than other factors in community empowerment for revegetation of the Arjuna mount forest. Furthermore, the role of forest management institutions was increasingly clear after a decision and decree from the Indonesian



Minister of Forestry Number 89 Year 2014 that forest village community institutions in the management and preservation of forest resources were responsible to the village head.

The forest village community institution was officially incorporated as a forum for community members to collaborate with the Indonesian state forest company in forest management under the principle of partnership. Forest village community institutions have the right to map village land around the forest, and together with the Indonesian state forest company, establish cooperation regulations as outlined in the articles of association and by-laws (Darmanto & Weningsih, 2014). Empowerment of forest village communities through the program of strengthening village forest community institutions can optimise the efforts to prosper rural communities around forest areas because forest village community institutions carried out planning, implementation, monitoring and evaluation of activities effectively and efficiently. Choiria (2015) explains more specifically the results of his research that institutional strengthening was the key to empowering farmers' welfare through human resource development, institutional development (rules of the game), technological engineering, and improvement of the social and economic environment.

In addition to institutions, facilities also infrastructure have a more prominent role than other factors in community empowerment for revegetation of the forests of Arjuna mount. In contrast, infrastructure was a potential factor that was very important in determining a region's direction and future development because development will not be successful and run well without adequate infrastructure support. Facilities and infrastructure explain the various facilities that can be used as tools and support for achieving the activity process as intended; in this research, the facilities and infrastructure for empowering the people of Leduk, Jatiarjo and Dayurejo villages include village road access, village transportation, clean water infrastructure, facility infrastructure health and education facilities. This was in accordance with Widjajanti (2011) that explained six indicators of the assessment of facilities and infrastructure for community empowerment, which include agricultural production facilities, educational facilities and infrastructure, health facilities and infrastructure, economic facilities and infrastructure, communication facilities and infrastructure, and transportation facilities and infrastructure.

Combined with strategic communication within the collaboration, the finding results significantly act as a model to preserve the Spring in Arjuna mountain. The combination also is part of the Environmental Communication assessment for community sustainability.

Based on the analysis and the phenomenon of community empowerment in the villages of Leduk, Jatiarjo, and Dayurejo, and the forest conservation area of Mount Arjuna, it is carried out through the development of human, economic and socio-cultural resources of the community. Another effort made is to increase the capacity of local

institutions, facilities, and infrastructure to provide the maximum benefit to people living in forest areas. Improving the community's quality of life provides benefits for the ecological value by ensuring the preservation of the function of the forest as a hydrological cycle and the preservation of water sources. It is also recommended that interested parties, including the community, Indonesian state forest companies, the government, and the private sector (companies), coordinate comprehensively and sustainably in joint forest management. We recommend establishing an organisational structure of shared responsibility to coordinate the implementation of forest and spring management, with the main tasks of empowering and reforesting forests and conserving springs.

## CONCLUSION

Human resources around the forest, namely the level of education and employment, contribute to reforestation. In addition, family economic conditions such as personal and family income, ownership of fields and rice fields for business, and livestock and fishery businesses also assist in reforestation. Furthermore, the social characteristics of communities around the forest, such as mutual cooperation and kinship, contribute to forest reforestation. On the other hand, community institutions, namely forest village community institutions, are a vehicle for the community to reforest the forest successfully. Finally, the availability of village community facilities and infrastructure such as paved access roads, transportation and communication networks, education and health facilities also supports reforesting Mount Arjuna's forests.

Most of the respondents agree that human, economic, social, institutional and community facilities and infrastructure around the forest contribute to the reforestation of Mount Arjuna forest. Respondents' perceptions explained that local institutional factors, facilities, and infrastructure played more roles in community empowerment for forest revegetation of Mount Arjuna than other factors. The role of forest management institutions such as forest village community institutions in the villages of Leduk, Jatiarjo and Dayurejo is increasingly functional and has collaborated with Indonesian state forest companies in managing forests with the community with the principle of partnership. Forest village community institutions have management rights in the lap forest plots in the village areas of Leduk, Jatiarjo and Dayurejo, where these institutions are located, cooperate with Indonesian state forest companies and receive a share of the results of the collaboration. Infrastructure and facilities have a more significant role than other factors in community empowerment for the reforestation of Mount Arjuna forest. Facilities and infrastructure used as tools and supporting community empowerment in Leduk, Jatiarjo and Dayurejo villages include village road access, village transportation, clean water infrastructure, health facilities and educational facilities.

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