



The Impact of Steam Electricity Power Plant Development on the Economic and Social Activities of the Community

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Abstract: Steam Electricity Power Plant (Pembangkit Listrik Pembangkit Uap (PLTU)) is a form of development that causes changes both in economic and social. The research aims to explain about the impact of development and operational risk of Steam Electricity Power Plant to economic change which is the disruption of economic activity, the decreasing of income which is experienced by almost society members especially farmer and fisherman. The research uses the qualitative method. The results show that the community faces various development impacts and operational risk from Steam Electricity Power Plant which is the change of profession, the disturbance of fishermen and farmers activity, and economic changes. The community's response in facing the risk is realised in the form of mind-set change, social capital development and changes in behavior.

Keywords: *Community; development; economic; social activities*

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INTRODUCTION

Background

PLTU is one of the forms of development policy to fulfill the electrical resource need of society. Development activities aim to bring change in the society to a better direction. Potentials owned by the societies are expected to be improved and developed optimally through development programs in order to achieve welfare.

PLTU activities consist of pre-construction, construction, operation, and post-operation stages. Each stage of PLTU activity will cause changes that affect society's life. Sifak (2006), construction activities of PLTU Tanjung Jati B have an impact on the availability of jobs for the surrounding communities. Jobs available are in form of opportunities to work at PLTU Tanjung Jati B and business around the PLTU location. The condition indicates that there are changes in the economic activities of the community before the existence of PLTU Tanjung Jati B until the construction period.

PLTU Tanjung Jati B, built in Tubanan Village, consists of four units that have been operating and two units are in the pre-construction period. Unit 1, 2, 3, and 4 have gone through the construction stage and operation activities is ongoing. The end of the construction period of unit 1 and 2, as well as 3 and 4, gave changes to the surrounding communities, especially in socio-economic aspects. Based on the observation result, there was a shift in the lane traffic of PLTU Tanjung Jati B. After the end of the construction period, the lane traffic was replaced with a new lane, whereas the previous main lane was no longer used. In addition, there were various businesses owned by the surrounding communities that are currently closed or no longer operated. The condition indicates a change in economic activities in the community.

The operation of PLTU Tanjung Jati B is not only brought changes in the socio-economic activities of the communities inland but also in marine economic activities. An online news article explained that a number of fishermen

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rejected the development of unit 5 and 6 of the PLTU. It is based on the reality on the field that water intake in unit 1, 2, 3, and 4 that currently operate do not have filters that meet the standard; thus many fishes are sucked and the catch of the fishermen is drastically decreased. Sifak (2006) stated that job opportunities in Tubanan Village during the development of PLTA indicate that farmer and fisherman professions are started to be abandoned by the community. New types of work occurred, such as PLTU employee, taxi bike (ojek), food seller, workshop, beauty salon, and car wash (Sifak, 2006). As an example, (Harjanto, 2016) seen the consequences of the use of fossil energy source and nuclear fuel on power plants; the negative impacts caused by PLTU are bigger than those of PLTN (Nuclear Power Plant).

The existence of PLTU, however, still maintains the stability of social function of the community (Purdananto, 2016). The policy of Suramadu Bridge development gave social impacts of 1) easy access to necessities, 2) improvement of human resources facilities, 3) the assimilation of Javanese and Madurese cultures, 5) the number of drug trafficking, criminalities and localization, and 6) the erosion of religious-based society's culture. Whereas, the economic impacts are: 1) smoother distribution, 2) an increase in income among creative communities, and vice versa (Yanti, 2013; Yoo, Lee, & Lee, 2016).

The impact of the existence of steam- electric power plant on health indicates that 75% of premature death at the age of 30 years and above in India was due to the effect of PLTU (Cropper, Gamkhar, Malik, Limonov, & Partridge, 2012). The existence of PLTU and coal mining in Bangladesh gave negative impacts on water source and quality, air quality, noise level, health condition, and ecology. However, it has created job opportunities, increased community utilities, attracted tourists, and improved economic growth (Alam, Ahmed, Khan, & Ahmed, 2011; Niesing, Merwe, & Potgieter, 2016; Pimonratanakan & Pooripakdee, 2017).

The impact of PLTU on sustainable development indicates that power plant that used hot steam as the turbine drive gave impact on the quality of soil and air as well as social impact. Mercury and the fly ash produced by the operational activities of the PLTU damage the surrounding environment (Dong & Keshavjee, 2016; Kumar, Katoria, & Sehgal, 2013). Bristy (2015) stated that Bangladeshi experienced environmental and social risks. The environmental risks were in form of natural disaster, insufficient natural resources and raw material availability, and poor physical infrastructures, whereas, the social risks were high population growth, income gap, and poverty. The central issues in the society are risks and how to prevent, minimize or distribute them. Beck (2015) stated that risk can be defined as a systematic way to handle hazards and greed caused and introduced by modernization. The goal of the risk society is safety. Efforts to achieve solidarity aim to avoid dangers that are mostly negative and defensive. In a developed industry, nature and society are closely related. It means that the change in a society often influences the natural environment and in the end, it influences society. Dialectically, an advanced modernity could pose unprecedented risks and reflective capacities that never existed to overcome the risks.

The aim of this research is 1) to find out the socio-economic impacts after the operation of PLTU Tanjung Jati B, 2) to find out the reflectivity of Tubanan villagers in facing the risks of PLTU Tanjung Jati B operation on socio-economic activities.

METHOD

The research used a qualitative method with data collection techniques of observation, interview, and documentation. Data validity test used source triangulation technique. The research used data analysis of Miles and Huberman model. Miles and Huberman in (Sugiyono, 2008) stated that activity in qualitative data analysis is conducted interactively and continuously until it is complete and the data is saturated. Data analysis activity was conducted in three stages, namely, data reduction, data presentation, and conclusion drawing and verification.

RESULTS

PLTU Tanjung Jati B

PLTU Tanjung Jati B is located in Sekuping Hamlet, Tubanan Village, Kembang Subdistrict Jepara Regency Central Java Province. Consideration for location selection was related to the geographic factors. The location of the PLTU is in the shore of Tanjung Jati beach located in coral reefs area of Tanjung Jati. Tanjung Jati Beach is dominated by reefs thus it is reasonable to build a large project.

In addition, topographically, the area is safe from earthquake and tsunami. The activity of unit 1 and 2 development

was started in 1996 and completed in 2006. The number of workers required for the project was 5.507 people consisted of expatriate and local workers. Expatriate workers were 273 people and local workers were 5.234 people. Unit 1 started to operate in October and followed by the operation of unit 2 in November 2006.



Figure 1 *Unit 1, 2, 3 and 4 of PLTU Tanjung Jati B (Research Document: April 16, 2017)*

Figure 1 displays Unit 1, 2, 3 and 4 of PLTU Tanjung Jati B. After unit 1 and 2 is operated, unit 3 and 4 are developed. Pre-construction activity of land acquisition was started around 2007 and completed in 2011 and inaugurated in 2012. Four units of the power plant were built on a land of 150 Ha. Electricity capacity produced by each unit is 662 MW with a total of 2.640 MW for all four units.

The Risks of PLTU Tanjung Jati B Operationalization on Socio-Economic Activity of Tubanan Villagers

The research result indicates some risks should be faced in socio-economic activities of Tubanan villagers. Those consequences were: the shift in the profession, disturbance in fisherman and farmer activities, and the change in the society income.

The shift in profession: The people of Tubanan Village, especially in Sekuping hamlet worked as farmer and fisherman before the development of PLTU Tanjung Jati B. The decision to build the PLTU in Tubanan Village brought a huge impact to the people who worked as a farmer. The shift in land utilization from a rice field to PLTU Tanjung Jati B indicated that industrial development activities had influenced the existence of agricultural sector in the village. On the other hand, however, the existence of the PLTU had opened big opportunities for economic development of the community. Farmers who previously cultivated the land faced consequences in their economic activities thus an action was needed to overcome the condition. There were two options to overcome the consequences, namely, to shift to other professions or cultivate rice field in the different locations. Social capital owned by the farmers, in this case, had a contribution in determining the future socio-economic condition. According to [Suandi \(2014\)](#), social capital is a form of socio-economic network in a society occurred between individuals and groups both formal and informal that is useful and profitable. Farmers with strong social capital would be easier to face the socio-economic issues compared to those farmers with less or no social capital. Through the network, members of the society could work together to face problems occurred.

Each stage of PLTU activities gave varied impacts on the environment and the surrounding communities. Pre-construction stage of land acquisition influenced the economic activities of farmers in the village as well as the construction stage. The economy of Tubanan villagers experienced a significant development during the construction of the PLTU since many members of the community worked at the project. The arrival of contractors and workers from other areas had open business opportunities for the surrounding community.

Once the power plant operated, many workers completed their working contract and returned to their origin areas. Before the PLTU, the community lived from economic activity as traditional farmers with simple life system. However, during the construction of PLTU, it opened a big opportunity for local society to work at the project and open a business.

The condition caused a positive change in economic activities. The economic life of the society was increasing during the construction period. Once the PLTU in the operational stage, however, the economic activity condition of the society was backed to stable just like before the PLTU.

Dialectically, modernity which was described as PLTU Tanjung Jati B in this research - caused unprecedented risks and reflective capacities that never existed to overcome the risks. The shift in profession experienced by the society indicated the presence of strong social capital role in economic activities. Social capital is categorized into two interrelated dimensions: structural and character dimensions. Structural dimensions are measured in form of group and organization (local association), whereas character dimensions are measured from the composite scores of trust level, solidarity, and work spirit (Ahadi & Suandi, 2014). Research result on the society found that social capital observable in the phenomenon was character dimension of trust level.

The condition of a shift in the profession could also be analyzed using Beck theory. After people enter the labor market, they experience mobility. If they are not ready to accept economic downfall, they will be forced to be responsible for their own life (Beck, 2015). The concept was applied in Tubanan villagers since the members of the society, who were previously worked at the construction site, would experience mobility once the PLTU is operated. The mobility consisted of work mobility as well as working place mobility. The activity of a shift in the profession or working location change was one of the driving factors of individualization among the villagers in Tubanan Village.

Disturbance in Fisherman and Farmer Activities

Operational activities of PLTU Tanjung Jati B gave influence on the activities of traditional fishermen in Sekuping hamlet. Consequences bore by the fishermen were in form of technical disturbances. Based on the experience of Ngelo traditional fishermen, fishing activities were disturbed due to the presence of jetty and collier. In addition, the presence of delimiting ship area also disturbed nets distributed by the fishermen when it exposed to the current.

The presence of jetty, collier, and other supporting operational activities of PLTU on the sea made the fishermen unable to distribute their net freely. They had to observe the net and had the ability to read the current condition because if the net was carried by the current and caught in the gelo-gelo or collier, the net would be damaged. In addition, the PLTU forbid the community to fish or look for fish around the jetty or water intake for safety reason. It made the fishing space for the fishermen, especially those in Ngelo was limited.

In addition to the loss of some of the rice field experienced by farmers, PLTU Tanjung Jati B also influenced the plants. The condition took place when the uncontrolled technical fault occurred in the operation of PLTU. The technical faults caused the chimneys of the PLTU takes out water vapor containing salt. The incidents caused farmers plants yellowing and dead. The negligence of the PLTU in monitoring their operational activities caused risks to the society, especially farmers. Besides damaging the plants, the scattered salt water caused rusting on iron-made household appliances, due to the corrosive property of iron to salt.

The Change in Income

Operational risk of the PLTU was the change in society income. The operation of the PLTU was one of causing factors for income instability of the society. The existence of PLTU, especially during the construction period, had caused a drastic increase in society income, especially those society members who involved in the project either as the employee or by opening a business. The construction period gave temporary benefits in form of increased income. The condition changed once the construction period over. The income returned to the stable condition just like before the PLTU since the professions were back to normal, except for those individuals who are creative in utilizing the opportunities. These creative, as well as innovative individuals, would gain permanent benefit from the operation of the PLTU.

The risk of the change in income was in form of a decrease in revenue experienced by almost all members of the society, including fishermen and business owners during the construction period. The decrease in the number of fish caught by fishermen was also a factor for the decrease in income. Operational activities of the PLTU of sea filtering section caused small size fishes entering the water intake. Many newly hatched fishes, as well as shrimps, were also sucked thus decreasing the number of fish to be caught by the fishermen.

The risk of decreasing income was also felt by those members of society who opened a business during the construction process of PLTU. Since the operation of the PLTU, income was drastically decreased for those members who had a trading business or opened a boarding house. Kiosks and boarding houses were closed because they no

longer had customers since all the newcomers returned to their origin places or moved to another location for work. The risk of a decrease in income was also caused by the end of employment opportunities during the construction of the PLTU. The condition did not mean that the economy of the society was decreasing permanently but it was just returned to their previous condition. Construction period caused a temporary increase in income and in operation period, the environmental and economic condition returned to stable.

Reflectivity of Tubanan Villagers in Facing the Risks of PLTU Tanjung Jati B Operation

The law of cause and effect prevailed in Tubanan villagers due to the operation of the PLTU. The operational activities of the PLTU brought various consequences to the socio-economic activities of the villagers thus responses from the society emerged regarding the consequences. The responses were manifested in form of reflection, perception as well as real action. Following are the reflectivity of Tubanan villagers:

The change in society's mindset: Besides the risks to the profession, the operation of the PLTU also impacted the society's mindset. Based on the research result, a positive consequence of the operation of PLTU was related to the perception of the society to education.

The main operational activity of the PLTU was run by huge machines monitored and controlled by experts in a certain field. Therefore, only several workers with specific abilities were needed. Workers needed in the operational stage of the PLTU were those workers who had specific education standard, skills and expertise. The condition made the society aware of the importance of higher education thus many school-aged members of the society pursued their education based on the standard of PLTU requirements. The existence of the PLTU became one of the driving factors for the villagers to consider and plan their future through education.

According to Beck (2015), going to school means to select and plan a way of life of one's education. An educated person will be the producer of his/her own working situation thus he/she becomes the producer of his/her own social biography (Beck, 2015). Standardization of worker recruitment for PLTU operation had encouraged the society to be reflective and able to read opportunities. Members of the society planned their own working biography. The people who were still pursuing their education mostly would take majors that are required by the PLTU. It was conducted so that they could work at the PLTU once they are graduated. The operation of the PLTU indirectly posed a social risk of individualization.

Communicating the risks and asking the PLTU's responsibility: The people of Sekuping hamlet who were disturbed economically had realized and communicated the risks to the PLTU. The physical risks in form of damage in net and other fishing tools due to the contact with the collier were compensated in form of goods and agreement was made regarding a regulation to ban the ships to operate at night. Fishermen, whose networks were damaged, communicated the problem through mass gathering and demonstration in front of the gate of the PLTU. The path was taken since negotiation for consensus received no immediate response from the PLTU.



Figure 2 *Damaged Fishermen's Net* (Source: *Global Sumut* (2013))

Responsibilities were also asked by farmers whose plants were damaged due to the technical fault of the PLTU. Farmers who suffered losses communicated the issue to the PLTU with the assistance of an NGO by bringing some evidence of valid laboratory results. The management agreed to give compensation according to the loss experienced by each farmer in condition that the farmers brought the scientific evidence.

Farmers were asked to make details of loss and showed scientific evidences of laboratory test results as the requirements for submission of compensation to the PLTU. The operation of PLTU had made the farmers lose due to the damage on the plants and they were also asked to do something else, which was proofing the damage through a laboratory test. It indicated new risks and reflections.

Tubanang villagers looked for various ways to overcome the danger and greedy introduced by technological modernization in form of PLTU Tanjung Jati B. One of ways to overcome the danger was by increasing group solidarity. The condition could be seen in the activity of fisherman group that suffered losses due to the damage of net that caught by the colliers. The fishermen formed a mass and conducted a social movement of demonstration. The movement was formed due to the risk they faced. Group solidarity was also observed among farmers who suffered losses due to the damage on their plants caused by the technical fault of the operational activities of the PLTU. Both fisherman and farmer groups strengthened their bond among their members to avoid danger.

The change in society's mindset: The operation of PLTU brought progress on thought regarding education as well as a change in the behavior of the society. The research result indicated the existence of unscrupulous members of the society who conducted fraud for their own interest.

The existence of the PLTU created competition among members of the society in an increasingly stronger economic activity, including in working. According to Beck (2015), the competition was based on qualification thus it enforced people to advertise their individuality, uniqueness of work, and quality. The operational activities of the PLTU required workers with a standard of pre-determined human resource qualification. The condition had made each member of the society to compete and show their own quality in order to be recruited. Members of the society who were not eligible based on the quality standard set by the company would look other ways to be able to work at the company.

CONCLUSION

The existence of unscrupulous people who cheated for personal benefit made people skeptical. Level of trust and solidarity among the members were decreasing. The society was traumatized, felt fooled and exploited. According to Ahadi and Suandi (2014) trustworthiness can be measured in form of one's trust level in the words, agreements, and acts that are consistent at the time of the relationship between individuals or groups or organizations in the society. Mutual distrust among members of a society indicates individualism in the society. The individualism of Tubanang villagers was related to the profession and future working prospect and it was indicated by the existence of fraudulence and mutual distrust among the members of the society.

The decrease in trust level caused the increasingly tenuous of social solidarity. According to Ahadi and Suandi (2014), social solidarity is a condition where society is willing to accept each other as a member of a system, and depend and trust each other to fulfill common needs thus tranquility and harmony are achieved. If the condition continued, it would cause the loss of social capital and impacted the socio-economic of the society.

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