

POLICY INCOHERENCE AS A HINDRANCE TO DEVELOP RENEWABLE ENERGY IN INDONESIA: THE CASE OF *TAMPUR I* LARGE HYDROPOWER



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**POLICY INCOHERENCE AS A HINDRANCE TO DEVELOP RENEWABLE
ENERGY POWER PLANT IN INDONESIA IN THE CASE OF *TAMPUR I* LARGE
HYDROPOWER**

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PREFACE

Within this part, I would like to present my high gratitude to God and all people who have been supporting me in completing my MSc. Thesis of Environmental Science at Wageningen University, the Netherlands. Attending master school abroad has become my childhood dream until I discovered my interest and passion to study and work with the issue of Environmental Policy. After my first three months arrival and attending several environment-related courses, I found energy issue seemed very interesting and promising to look at, especially in the future of sustainable development across countries around the world. The reason behind I chose renewable energy transition is because of my interest of doing research of sustainability transition in developing countries, like my country, Indonesia. For example, identifying on the bottlenecks of why the transition process seemed very challenging to be implemented.

The process of completing this study was challenging and difficult yet fun at some points. As this research lies in Indonesia, it is not that difficult to get the access of data. I could experience other parts of isolated area or village in *Sumatera* Island which I never seen before, including the livelihood of the local people and how the interaction between state and non-state actors in a real.

In this respect, I would like to express my gratitude once again to Allah SWT., my parents in Indonesia, LPDP (Indonesian Endowment Fund) for rewarding me as a scholar to continue my master study for these last two years, my fiancé Deny Prasetyawan, all of my friends at Wageningen and Indonesia that I could not mention one by one, for always believing, supporting, and praying me.

Last but not least, I would like to highly thank to my supervisor, Dr. Mattijs Smits, for every help, guidance, motivation, feedback, and critics that are very precious as a learning process of mine. Thank you very much for being so cooperative and patient to contribute to this thesis writing research. I received positive encouragement, especially regarding my style of writing and the way of logical thinking to research.

Deanty Mulia Ramadhani

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ABBREVIATIONS

MEMR	Ministry of Energy and Mineral Resources
ESDM	Energy Resources and Mineral
MOEF	Ministry of Environment and Forestry
MOPW	Ministry of Public Works
PLN	<i>Perusahaan Listrik Negara</i>
RUPTL	Power Supply Business Plan
KEN	National Energy Plan
<i>Permen</i>	Government Regulation
MW	Mega Watt
GW	Giga Watt
PPA	Power Purchase of Agreement
LC	Local Community
HP	<i>Harimau Pining</i>
RG	Regional Government
NGO	Non-Governmental Organization

ABSTRACT

The Indonesian government has set a national energy target to decrease the use of fossil fuel by developing renewable energy in Indonesia. To achieve this target, central government, under MEMR and PLN, has been constructing renewable energy power plant across regions. Yet, in practice, the development of renewable energy power plant involves multi-sectoral actors and policies. This situation leads to the involvement of different policy domains which address different targets with a number of different policy instruments. Multi-sectoral actors and policies have resulted in a multi-perspective approach towards the specifics of renewable energy power plant development in Indonesia. In the past, most coherence researches on past policy disregarded stakeholders' perspectives towards a socio-technical change. By focusing on the development process of *Tampur I* large hydropower in *Lesten*, this paper aims to identify how the involved multi-stakeholders comprehend the interplay of policy coherence influencing the implementation process of *Tampur I* hydropower.

This research discovered that the three main areas of external policy incoherence lie in energy, forestry, and environment domains. The policy incoherence is primarily driven by large participation of top government bodies with competing policy-making authority and poor implementation of policy instruments among themselves. Here, the legitimacy of 'who does what' acts as the source of a cycle of negative interaction in relation to policy incoherence. Discouraging local actors, either state or non-state parties may also have negative transitional influence in the implementation process of *Tampur I* hydropower. Thus, the role of key stakeholders is necessary to set a clear bottom-up scheme of implementation to increase policy interaction between domains and levels of government, as well as to strengthen the legitimacy of hydropower for local stakeholders.

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1. Introduction

The introductory chapter presents the subject and background of this research, which explains why this study is necessary. It includes sections on the status quo of the problem, research questions of this research to identify how the policy coherence influences the renewable energy development and transition in Indonesia.

Renewable energy transition is one example of how actors with different interests and operational levels interact. Indonesian government, under MEMR and PT. PLN, the state-owned enterprise, launched 35,000 MW program as a renewable energy transition project. This program would establish power plants with a total capacity of 35 gigawatt (GW) or 35,000 megawatts from 2014 to 2019. This program is also intended to revitalize Indonesia's core infrastructure, which requires approximately \$100 billion to implement (U.S. Department of Commerce, 2016). In this sector, MEMR is the primary body responsible to govern the Indonesian energy sector. Additionally, MEMR also manages relevant activities of PT. PLN utilities, energy companies, and other relevant bodies. In the energy sector, several ministries, such as MOEF, BAPPENAS, and other agencies are involved with different operational levels (Tharakan, 2015). Geels (2005) in his study also mentioned that energy supply sector is considered as a socio-technical system because it consists of multiple actors, processes, and institutions, including the regulations, public authorities, and power struggles which is interrelated with each other. As well as, Markard (2012) stated that socio-technical transition, such as sustainable transition, is known to involve multiple actors with a dynamic systems.

The large involvement of multi-actors and policies in sustainable transition process appears to be interesting to look at. Not only limited to the interaction of actors or stakeholders, also the interaction of different policies from different sectors. The systemic perspective within the sustainable transition appears to relate to the concept of policy coherence which develops into the key analysis of policy interactions and mixes (Nilsson et al., 2012). A causal effect relationship between two institutions can impact the development or actions of one institution and or the others (Breitmeier, 2000). The effects may disrupt the target and effectiveness of institution policies (Nilsson et al., 2012). The target of MEMR to increase the energy supply to 35,000 MW may be influenced by other relevant sectoral policies from different institutions.

1.1 Problem Statement

The Indonesian government has set an ambitious target for the adoption of renewable energy transition through the 35,000 MW program. The transition towards renewable and

sustainable energy projects involves different ministries and stakeholders with their different operational levels (Tharakan, 2015). According to National Energy Plan (RUPTL 2017-2025), *Tampur I* hydropower emerges as one of national supporting project. *Tampur I* hydropower is an example of renewable energy project which assesses the efficacy of policy coordination across multiple actors in Indonesia. It is a large scale hydropower project located in the protected Leuser ecosystem forest area, precisely in *Tampur I* hydropower, *Gayo Lues* Regency. It is expected to produce 428 MW of power to the local people in *Gayo Lues* regency and along Sumatera Island.

Observing the case of *Tampur I* hydropower, its first issue lies in the high involvement of multi-sectoral stakeholders in the development process. Number of different national institutions involve in the development of *Tampur I* hydropower potentially drives to discoordination in the policy implementation process among institutions. That condition may become the bottleneck in completing the development of *Tampur I* hydropower based on the COD (Commercial Operating Date) assigned by MEMR and PLN in RUPTL. According to the interview and observation of this thesis, the central governmental institutions that involve in *Tampur I* hydropower development consist of the MEMR, MOEF, MOPW, and PLN. These multi-level stakeholders are the result of a multi-sectors participation in *Tampur I* hydropower development process from the beginning. Various interests in designing, implementing, managing, and monitoring make the development process of large *Tampur I* hydropower complex and multi-faceted. Moreover, the diverse set of ministries exercising high authority and power leads to different policies attempting to regulate and influence the development process of *Tampur I* hydropower. The involved ministries have their own requirements which must be fulfilled for the sake of long-term governmental target in renewable energy development. Several non-state actors are also involved and monitoring the implementation process of *Tampur I* hydropower with their own capacities. The involvement of different levels of stakeholders creates multiple interpretations and perspectives in defining the importance of building and developing *Tampur I* hydropower.

The second issue of *Tampur I* hydropower is the multiple policies involved in its development process. Several central governmental institutions are involved in *Tampur I* hydropower. The high level of power and strategic positions in governmental organization structure allow them the authority and coverage to issue a set of institutional policy instruments and regulations with regards to renewable energy development in Indonesia. Yet, from the policy perspective, many actors can cause a conflict of interests, which risks policies

incoherency (Dubé et al. 2014). One sector which consists of layers of policies has a high risk for incoherence of several policies in different sectors (Kern and Howlett, 2009; Smith et al., 2010; Kern, 2011; Huttunen et al., 2014). Here, the involvement of multi-sectoral actors conceives a high risk for the failure of policy coherence, which will hamper the implementation process of *Tampur I* hydropower. For example, the existence of *Tampur I* hydropower information progress report from the investor and central government to regional government (RG5, 2018) is currently unknown. The potential for policy coherence lies in the management of policy process or the implementation level where stakeholders' coordination is the most essential way to deal with conflict, competing interest, and multiple levels of power (Di Francesco, 2001). The failure of policy coordination affects the time period of development process of *Tampur I* hydropower in terms of designing, implementation, monitoring, and evaluation process.

In the central government level, all stakeholders have been briefed that issues related to the energy sector are under the responsibility of MEMR. This results in MEMR being the central actor of policy coherence to trigger renewable energy development project, particularly from the perspective of sectoral policy goal. As the result, the implementation level of *Tampur I* hydropower project is also influenced by other policy instruments from other sectors in practice. The social tension emerges due to the competition and difference perspectives of the importance of *Tampur I* hydropower development project. The failure of policy coordination makes the promotion of sustainable transition inefficient and difficult to implement (Webe and Rohrer, 2012; Huttunen et al., 2014). Not all selected relevant policies are coherent with each other due to competing interests of stakeholders (Huttunen et al., 2014) in terms of the outcome of the policy and implementation process (Di Francesco, 2001). In this case, the involved stakeholders from other sectors also play important role in designing, monitoring, and ensuring that multi-sectoral policy implementation is on track, as well as meeting the target to reach 23 percent of renewable energy of total energy mix.

Last but not least, the traditionally decentralized governance in Indonesia also becomes an issue in *Tampur I* hydropower development. Decentralization creates power struggles between central and regional governments over control of natural resources with different interests. However, the coherence of underlying policies has only been assessed by merely analysing the top-down process. Whereas, the grassroots level actors may have more understanding on which policies are relevant since they are the ones who will experience the

effects of the policy in the implementation level. Not all policies can be coherent or desirable because of the different interests and goals (Weber, 2012).

Therefore, by focusing on *Tampur I* hydropower plan project, this thesis aims to analyse the policy coherence in developing the energy transition towards a society. This thesis examines the coherency of relevant policies influencing *Tampur I* hydropower, how to minimize or avoid the policy coherence problems to trigger the development process of *Tampur I* hydropower, and to what extent do the involved stakeholders design policy coherence and create mutual understanding among themselves. It will also analyse the impacts of transition which emerge in the development process of *Tampur I* hydropower from the perspectives of involved actors.

1.2 Knowledge gap on previous research

This research focuses on policy coherence analysis in the transition process of renewable energy sector. Currently, there are a lot of research or studies discussing the issue of policy coherence in international level. Growing literatures on the policy coherence to trigger sustainable transition has encouraged and driven this research. Yet, little research has been undertaken in terms of policy coherence in Indonesia, particularly in the sector of renewable energy development and transition. This section also shows some gaps among the different studies with regards to TIS framework used in analysing policy coherence in energy sector.

1.2.1 Knowledge gap on policy coherence

There are several methods of identifying the degree of “policy coherence”. Di Francesco (2001) showed that the concept of policy coherence was translated in the way of traditional understanding as the coordination process. Policy advice was the application of performance measurement to identify if the policy was coherent or not. He adopted policy evaluation to analyse the policy management in Australia. The result showed that policy advice adopted political realist position, which highlighted on how the tools of policy coherence should manage the policy-making process rather than the outcome. In his finding, he focused merely on cooperation of management process of one policy to assess the policy coherence. The issue of policy incoherence degree was either good or inevitable in the context of policy management, if the policy-making process prioritises democracy rather than the competing interest and expected outcome in. His finding did not consider the possible interaction of different policy sectors in the management process.

Nilsson et al. (2012) identified policy coherence with different types of measurement, such as horizontal, vertical, and internal coherence. They focused on the interaction or

relationship between sectoral policies by identifying the policy objectives, policy instruments, and policy implementations or practices in different levels. Three elements of measurements in his framework are integration, coherence, and impact analysis to analyse the comprehensiveness of policy coherence. Yet, their findings did not include the perspective of society who adopt the policies and get influenced by the policies.

Huttunen et al. (2014) combined policy coherence framework built by Nilsson et al. (2012) and May et al. (2006) by conducting bottom-up approach to analyse policy coherence. Huttunen et al. (2014) identified the perspectives of actors in relevant sectors and different levels of stakeholders. This covers the gap of finding of Nilsson et al. (2012) which took a place at top-down policy coherence analysis approach. Yet, the study conducted by Huttunen et al. (2014) took a place at a national scale of renewable energy project, which is biogas and may not be applicable for specific regional scale of renewable energy project, for example in certain rural or remote areas, yet get affected by national policies.

To conclude, the gap of the policy coherence studies that have been undertaken previously lies in the perspective of involved stakeholders and the scale of energy project. The previous policy coherence research mostly took a look at policy documents and took a place at the overall renewable energy sector, especially in Indonesia. Hence, this thesis is expected to cover a little knowledge gap of policy coherence studies by focusing on a specific energy project in specific region and identifying perspective of different stakeholders towards the existing policies. Hence, the further policy coherence studies can be elaborated to identify the degree to what extent policy coherence supports the renewable energy development.

1.2.2 Knowledge gap on TIS framework

Hekkert et al. (2007) described the emergence of innovation or technological change process using the seven functions of innovation system. The proposed framework focused and highlighted that technological change contained a number of processes which were labelled as functions of innovation systems. They proposed the following set of functions to map key processes in the technological change. Hekkert et al. (2007) mentioned a set of seven key functions are necessary to perform an operationalization of innovation system. The functionality of TIS in this study merely looked at weakness of each functions that influenced the industrial development process.

Compared to other policy coherence studies, Huttunen et al. (2014) did not only examine policy coherence, also the relationship between policy coherence and the triggering

transitions effects in biogas sector. Huttunen et al. (2014) adopted TIS approach to study particular technological development process to understand the elements which may influence the technological change process. Different with Hekkert et al. (2007), in their study, one function, the point of positive externality, was omitted from the TIS analysis.

To conclude this section, there are several gaps of previous research on TIS framework to understand the transition and innovation system and policy analysis. The knowledge gap lies in the assessment of TIS functionality and indicators to determine the functions, since systems develop in the different way. The previous studies have not covered yet on how TIS framework is applicable for a specific case of renewable energy project in specific area or region. Further research on TIS approach is needed to elaborate and develop the opportunities and limitations of innovation system analysis, including the relationship with the policy context.

1.3 Research objectives

The objective of this research is to analyse the degree of coherence of the relevant interplayed policies which influence the development process of *Tampur I* hydropower. By focusing on *Tampur I* hydropower, this research examines the extent of the policy coherence in the development process of *Tampur I* hydropower and identifies the policy interaction from different domains in different functions of TIS framework which influences the development process of *Tampur I* hydropower.

1.3.1 Main and sub research questions

The key question of this research is: *"How does policies coherence support the development process of Tampur I large hydropower from the perspectives of involved stakeholders?"*

1.3.2 Sub-research questions

1. What is the role of different stakeholders in the policy implementation process of *Tampur I* hydropower?
2. How coherent are the policies in energy, forestry, environment, and water management domains in the development process of *Tampur I* hydropower?
3. What are the identified weaknesses of functions in the implementation process of *Tampur I* hydropower?

2. Theoretical framework and Research Design

This chapter consists of two main sections; they are a research framework and theoretical framework. The first section presents the theoretical framework, which provides fundamental theories to support the analysis process. The theoretical framework provides supporting literature review of theories used in the research. The second section describes the steps of analysis process building in this research. It is designed as a guideline of step by step analysing of the research.

2.1 Theoretical Framework

This section addresses several theories that are used to answer the research questions and achieve the main objective of the research. The main theories used in this study are policy coherence analysis and Technological Innovation System (TIS) to identify the hindering factors in triggering the development process of *Tampur I* hydropower. Policy coherence analysis aims to understand the coherence and consistency of policy goals, policy instruments, and implementation with regard to *Tampur I* hydropower development. Meanwhile, TIS is a tool to analyse effects of policy coherence or incoherence in different domains and system functions to the implementation of *Tampur I* hydropower plan project. These frameworks help this research to find the supporting theories to answers of the research questions. Using TIS framework is expected to aim analysing the factors that may support or hinder the development of *Tampur I* hydropower.

2.1.1 Stakeholder identification

Stakeholders identification aims to distinguish between different categories of stakeholders; for example, between primary and secondary stakeholders, according to three key attributes consist of the level of power, the legitimacy of the stakeholders, and the urgency of stakeholder's claim (Mitchell et al., 1997). Building such a typology of stakeholders helps to understand in what way each of stakeholders acts, how their power and interests influence their action for solving the problem. Different stakeholders have different goals and targets which will influence their response towards the problem for the sake of satisfying their own without taking into account the others (Sharp et al., 1999). Every individuals, actors, groups, and organization that involve and get affected, will contribute to influence the decisions and results of a problem, for instance by creating joint cooperation which one particular actor or organization convince the others to follow one particular goal of an organization, or collectively create a collective purpose (Bryson, 2004). Hence, through the involvement of multi-

stakeholders, different actors and organizations bring their common interests to agree upon one collective purpose. There is no particular definition to assign the entities that could be defined as a stakeholder, including persons, groups, neighbourhoods, organizations, or institutions can be defined as potential stakeholders (Mitchell et al., 1997).

In the case of *Tampur I* hydropower, there is a number of different stakeholders involve in its development process. It is important to identify the involved stakeholders before identifying the policy influencing the development process. Reed et al. (2009) developed methods used in stakeholder analysis; they are (1) identifying stakeholders, differentiating between and categorizing stakeholders, and (3) investigating relationships between stakeholders with various of participation level of stakeholders from passive to active engagement. Methods for identifying stakeholders and their stakes usually is an iterative process through (1) semi-structured interviews, and (2) snow-ball sampling, or (3) combination of these both (Reed et al., 2009). Within the identification of stakeholders, the stakeholder groups are classified or categorized by specifically asking if there are marginalized groups within the interaction (Dougill et al., 2006). Stakeholder identification method includes who is included and who is omitted based on the purpose of stakeholders analysis by classifying and categorizing the involved stakeholders in the system (Reed et al., 2009). After identifying the involved stakeholders, the next step is necessary to assess the following stakeholders' attributes (Mitchell et al., 1997) in which they can be positioned within the stakeholders using the stakeholders mapping (Lopez, 2001), the mapping is used to classify their position towards the project or problem. There are various numbers of classifications their position towards the project or problem. There are various numbers of classifications system of stakeholder analysis, for example, stakeholders mapping by Mitchel et al. (1997) lay out the types of stakeholders in business management to stakeholders mapping matrix based on legitimacy, power, and urgency. Mapping stakeholder matrix aims to group the number of involved stakeholders' positions and identify the interactions between stakeholders (Bawole, 2012).

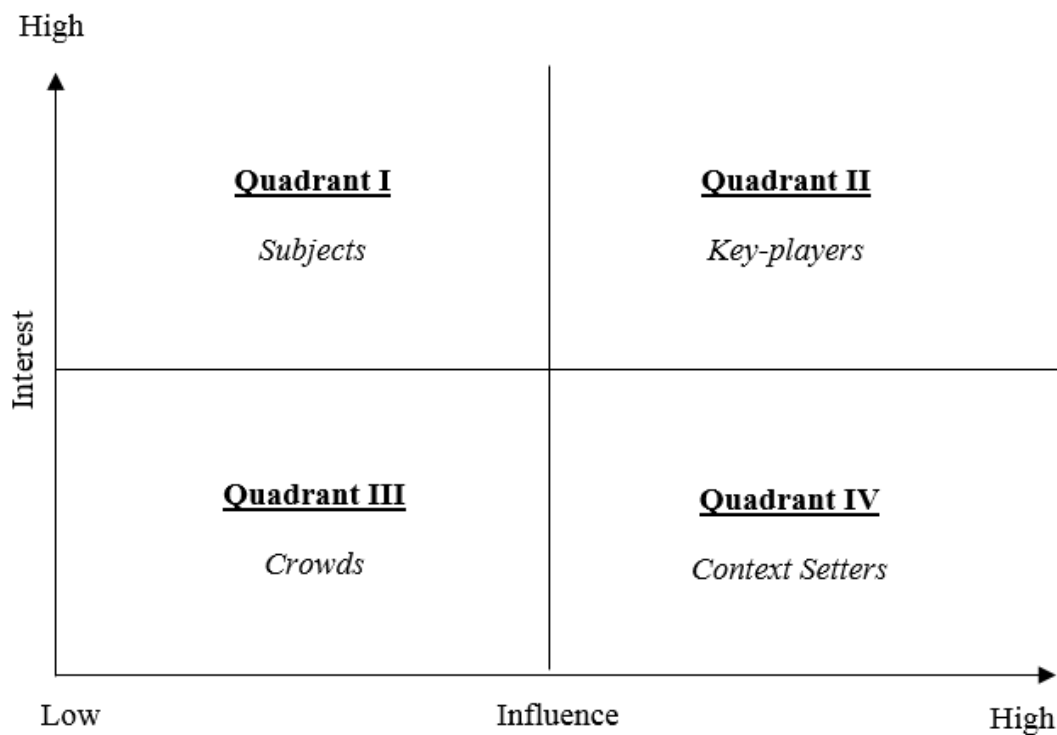


Figure 1. Relationship between influence and interest of stakeholders in grid (quadrant) analysis (Bryson, 2003; Reed et al., 2009; Bawole, 2012).

The figure above shows the stakeholders matrix to show the relationship between the level of power or influence and interest of the stakeholder on the project. Bryson (2003) and Reed et al. (2009) classified the groups of by dividing them into four classes or quadrants according to their position towards the project or problem. They consist of (1) subjects, (2) key players, (3) crowds, and (4) context setters (Bawole, 2012). Interest-influence matrices place the involved stakeholders on a matrix based on their following relative interest and influence which are usually conducted by having a focus-group or semi-structured interviews in the forms of individual in-depth interview or expert interview (Rowe and Frewer, 2000; Reed et al., 2009).

2.1.2 Policy coherence analysis

This section addresses the existing theory of policy coherence which is adopted and used in this study. Several sectors which relate to *Tampur I* hydropower development process will be analysed to identify the degree of coherence. Policy coherence is an attribute of policy that aims to systematically reduce the conflicts and promote synergies between and within the different policies from different sectors to achieve systematic support and multilevel understanding coherence (Nilsson et al., 2012). This concept is fundamentally already

recognized by the government of Indonesia for the need of policy harmonisation, procedures alignment and conflict resolution (Harahap et al., 2017).

Several studies on policy coherence have different fundamental in defining the degree of coherence of policy. Di Francesco (2001) defined policy coherence in two separated definitions between the controls of process and outcomes. Nilsson et al. (2012) defined policy coherence as an ‘attribute’ or a ‘tool’ to eliminate the potential conflicts and promote the synergy between and within different policy domains. Carbone (2008) defined the concept of policy coherence, in which the interplay between different policies from different domains push different directions in the regional and global level. Despite the objective of policy coherence analysis is pursued to determine and enhance the synergies and eliminate the potential conflicts between the competing policy domain, yet there is a little number of research has been undertaken (Nilsson et al., 2012). Policy coherence has been a concern for policy-makers to make an effective policy by understanding how one specific policy influences the other policies (Kalaba et al., 2014).

Den Hertog and Stross (2011) defined policy coherence by referring to the synergy of external policy. Nilsson et al. (2012) assess the coherence of policy by analysing the compatibility of three elements of policy analysis consisting of policy target, policy instrument, and policy implementation. Cejudo and Michel (2017) determined that policies are coherent if the policy-making process is properly implemented and able to achieve the broader goals of policies. Cejudo and Michel (2017) assessed policy coherence using three dimensions, and they are coherence among objectives, instruments, and target population. Policy coherence in this sense implies the correct targeting of policies from entire policy domains to design a set of policy in a way where anyone suffering (Cejudo and Michel, 2017). Different from traditional policy coherence perspective which more focuses on top-down approach, Huttunen (2015) assessed policy coherence using the bottom-down approach from the policy perspectives of local actors in terms of implementations or practices level.

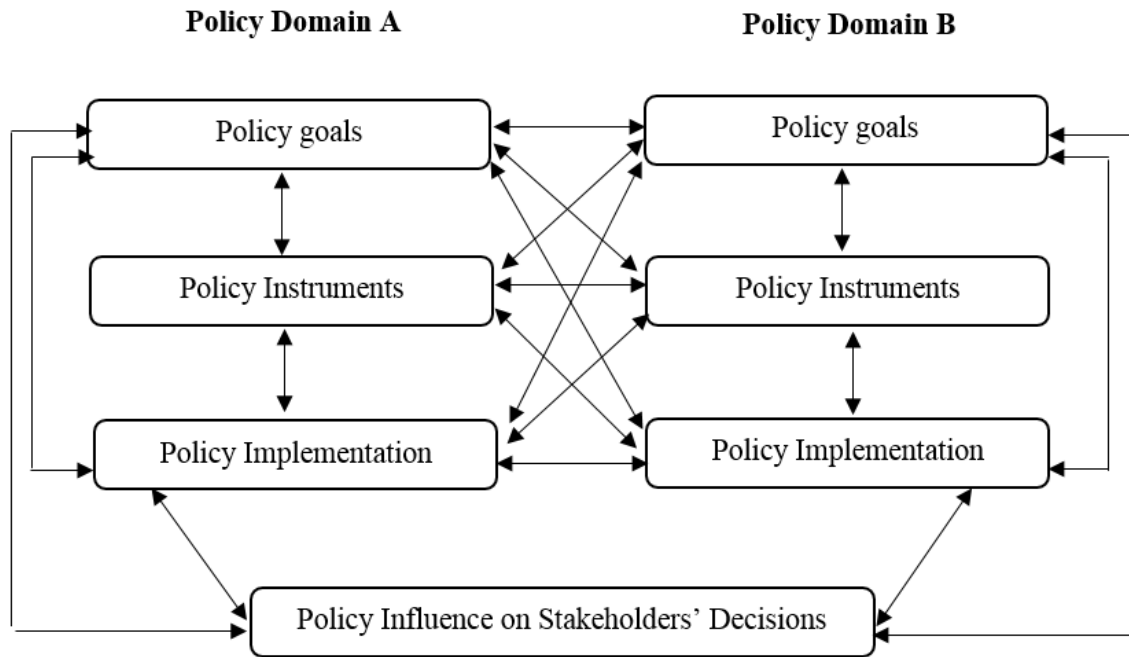


Figure 2. Policy coherence dimensions (redrawn from Huttunen et al., 2014; Nilsson et al., 2012).

Huttunen et al. (2014) developed policy coherence analysis using three dimensions by referring to the framework build by Nilsson et al. (2012). They are (1) internal, (2) external, and (3) temporal dimensions. They analysed how the interactions between sectoral policy goals, instruments, and implementations practices to see how each of policy domain affects the other domains (see Fig. 2). Internal coherence studies within a single policy, whereas the external studies between different policy domains. The policy interactions are also assessed from the horizontal and vertical dimensions to examine if they are aligned in achieving the coherence in the implementation level.

Nilsson et al. (2012) built a policy coherence analysis template by drawing and understanding the interaction of sectoral environmental policies (external and horizontal policy interaction). Horizontal assessment means comparison between different policy goals and vertical assessment addresses comparison between policy goals and policy instruments (Huttunen et al., 2014). In the case of EU policy, Carbone (2008) defined horizontal coherence as a potential policy problem due to the interaction between combined policy areas, meanwhile vertical coherence regarded as the consistency between different policies from different policy areas across the member states of EU. As the combination of policy coherence analysis perspectives between Nilsson et al. (2012) and Huttunen et al. (2014), the policy coherent is assessed by not merely looking at horizontal and vertical dimensions. They also considered the

external policy dimension by analysing the issue of consistency and predictability of policies over the time. In summary, policy coherence is emerged as an institutional innovation to engage economic actors and as solutions to the complexity of human problems (Dube et al., 2014).

2.1.3 Policy Coherence and Technological Innovation System

The objective of this study is to analyse the impact of relevant policies, whether they are coherent or not, on the development process of *Tampur I* hydropower. This technological change on energy transition is assessed using Technological Innovation System (TIS) approach. This section addresses the fundamental theories of TIS which are used in the analysis of this study.

Before developing the theoretical framework and methodology of this study, it is very important to understand the renewable energy sector as a system. Generally, a system is defined as a group of components or elements comprising objects or actors and devices or tools which are coordinated, interacted and collective actions (Bergek et al., 2008). In their finding, contextually, actors in the system do not necessarily work together and share the same goal, for instance, multi-actors and multi-sectors are also considered to influence the system performance. The energy sector can be conceptualized as a socio-technical system (Hughes, 1987; Joerges 1998; Markard et al., 2012). A socio-technical system is regarded as the outcome of the activities of human actors that is embedded in social groups in which the members share certain roles, responsibilities, and different norms and perceptions (Geels, 2004). The distinction between technological system and socio-technical system lies in the involvement of institutional structures. Socio-technical system also includes changes in non-technical innovation which affects societal domains. For example, policy-making process, the emergence of residential areas, livelihood of a particular society which may change structures of existing system (Markard et al., 2012). The social groups have their own vested interest, perceptions, preferences, and strategies which imply in the transition process with multi-actors, interactions, and power struggles (Geels, 2005).

TIS framework is useful for analysis of multiple policies that are working at point in time and identification of policy gaps regarding the functions, as well as the transition and innovation of new technology (Kivimaa, 2014). In the context of the emergence or formation of new specific technology innovation or transition system, TIS provides a related fundamental of the theoretical framework to study the limitations of socio-technical change by the policy-making process (Jacobson and Bergek, 2011; Kivimaa and Kern, 2016). The role of national

policy can either provide triggering or hampering effects to the socio-technical system (Suurs and Hekkert, 2009). Huttunen et al. (2014) also used the TIS framework in identifying the policy coherence to trigger the production of biogas sector in Finland. The TIS is a social network formed by actors and institutions with a specific technology (Huttunen et al., 2014).

TIS consists of several steps of analysis (see Figure 3), starting from defining the technological innovation system, identifying the structural components, such as actors, networks and institutions, also structural functions (Bergek et al., 2008). After identifying the first structural components of the TIS, the next step is mapping the functional pattern of the TIS. This is because the intertwinement sides between structure and function which influence each other and vice versa (Markard and Truffer, 2008). TIS approach aims to address the questions of whether technological innovations, such as sustainable innovations are successful or not from social, economy, and ecological dimensions (Suurs and Hekkert, 2009). The figure below describes the scheme of analysis of TIS framework in the socio-technical system developed by Bergek et al. (2008).

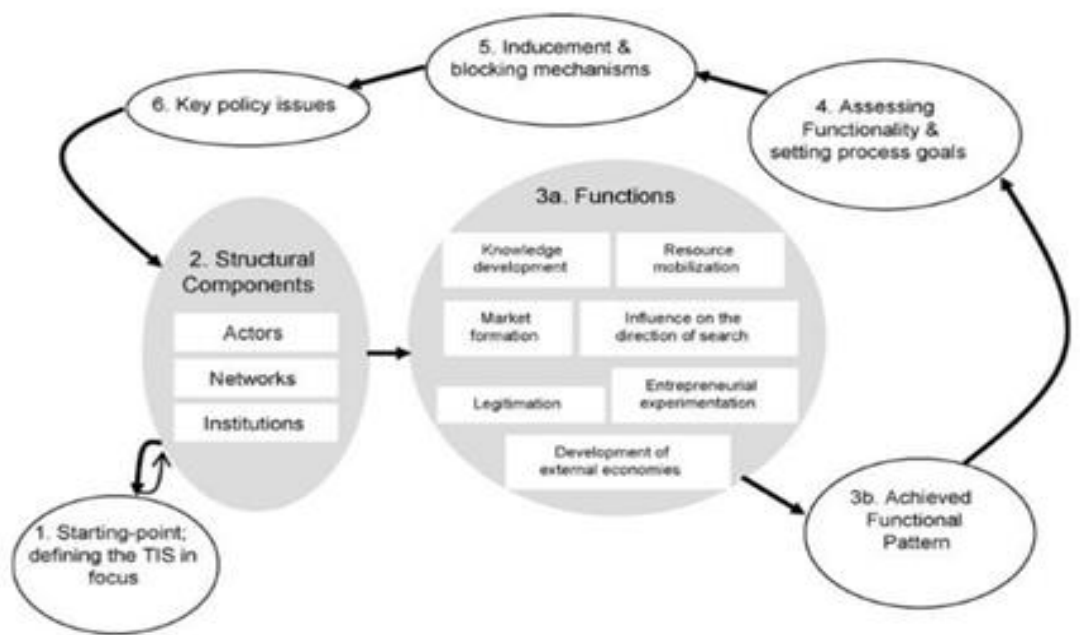


Figure 3. The scheme of analysis (adopted from Bergek et al., 2008)

In TIS framework, it is necessary to define the focus of analysis in the TIS framework, which Bergek et al. (2008) outlines three types of analysis choices, they are: (1) the choice between knowledge field or product, (2) the choice between breadth and depth, and (3) the choice of spatial domain. The starting point of analysis is selected on the objective of study and interests of the involved stakeholders in the system. The selection of focus analysis of the TIS

depends on the choice made with regards to a different set of actors, incorporated networks and institutions occurring in the system. Focus analysis of product-group based, for instance, renewable energy in Swedish TIS including the development of wind turbine in Sweden (Johnson and Jacobsson, 2001).

Hekkert et al. (2007) proposed a set of seven functions in the system of TIS analysis in mapping the key activities. These functions comprise (1) entrepreneurial activities, (2) knowledge development, (3) knowledge diffusion, (4) guidance of the search, (5) market formation, (6) resources mobilization, (7) creation of legitimacy or counteract resistance to change. The first function is entrepreneurial activity which is the new entrance with vision of business opportunities in the new market to develop the business (Hekkert et al., 2007). Testing of new technologies and creating the market are also included as entrepreneurial experimentation (Jacobsson and Bergek, 2011). The second is knowledge development which Jacobsson and Bergek (2011) combined with the function of knowledge diffusion in their study. They defined the combined functions as the breadth, depth, and the process of knowledge development and diffusion in the system. Hekkert et al. (2011) defined knowledge development and diffusion in separated functions. On the one hand, in their study, knowledge development can be assessed from the amounts of patents and publication with regards to the innovation or transition process. On the other hand, knowledge diffusion or exchange is identified based on the type and amount of the networks of how the knowledge is transferred.

The third function is called as an influence on the direction of the search. Huttunen et al. (2014) described it as the incentives and pressures for an institution or organization to enter the market and start the innovation or transition development process. The indicator of this function is based on how an organization sets a vision, mission, strategy, and expectation to complete the process. The fourth function is market formation. Wiczorek et al. (2013) described market formation function as the process of market creation for new technology to enter, including analysing the size of the market to create and sustain the innovation and transition process. The fifth function is legitimacy, which Huttunen et al. (2014) defined it as the process of social acceptance and compliance with the institutions and legislation related to the innovation and transition. The sixth function comes with resource mobilization. This function is defined as the degree of what extent technology can be mobilized and accessed by society (Jacobsson and Bergek, 2011). The seventh function, considered as the last function, is development of positive externalities. In the study of Bergek et al. (2008), they defined positive externalities function as the positive influence or benefit to other actors due to the new

technological system. Positive externalities can be in any form for example, in the study of Haase et al. (2013) which named a new function called support from advocacy coalitions and considered it as positive externality. Yet, Hutunnen et al. (2014) and Jacobsson and Bergek (2011) excluded positive externality function from the system.

Hekkert et al. (2007) and Hekkert and Negro (2008) also assumed that there are many possible interactions in the virtuous cycle in the field of sustainable technologies emergence with possible starting points that may occur in every functions. All the key events or activities are mapped and allocated to the seven functions which are defined integrated and related to each other. Hekkert et al. (2007) in his empirical finding stated if there is a merely small number of events allocated to a specific function, that function may not be relevant to understand the technological change process. All categorized events can be either positive or negative effects in the process. The negative effects as the weakness of the system should be perceived and tackled from policy perspectives (Jacobsson and Bergek, 2011). The use of the functions in the system is fundamentally to identify the extent to which and how each of function supports the system performance. For policymakers, TIS emerges to provide information for them to make a decision and face the factors or challenges that influencing the growth of the system.

2.2 Research design

The research framework below depicts the research design which describes the steps of the analysis process of this research to achieve the research objectives (Figure). In general, this research applies triangulation of methods and sources in the case study, thereby there is a multiple numbers of sources and different methods used. The research framework of this study consists of two parts, which are general steps and detailed steps of the analysis process. The first is the circle shapes that present the general steps of the process of analysis that have been undertaken to achieve the research objectives. The second one is the rectangle boxes which describe the detail of analysis steps.

The analysis process of this research consists of four steps. The first step of analysis is a theoretical framework, which is already done (see Section 2.1). This step is conducted to support the empirical research by doing a literature review and gaining the knowledge of relevant theories and studies to policies of renewable energy development as the topic of the research and *Tampur I* hydropower as a case study. The second step of the analysis is the empirical research. After collecting the theories of existing knowledge, the analysis processes are applied empirically in one specific case to explore the detail of the study. Within the empirical case study, the theoretical framework is completed by provided required data that is

relevant to *Tampur I* hydropower development process, including stakeholders data, policy and innovation data.

The third step is analysis part which the performed case results in *Tampur I* how the involvement of stakeholders (stakeholder analysis), whether the interplay policies are coherent to trigger the development of *Tampur I* hydropower process, and how they interact each other. From the outcome of analysis, this study enables to come up with several points of the conclusion of the research objectives and recommendations with regards to the implementation process of *Tampur I* hydropower.

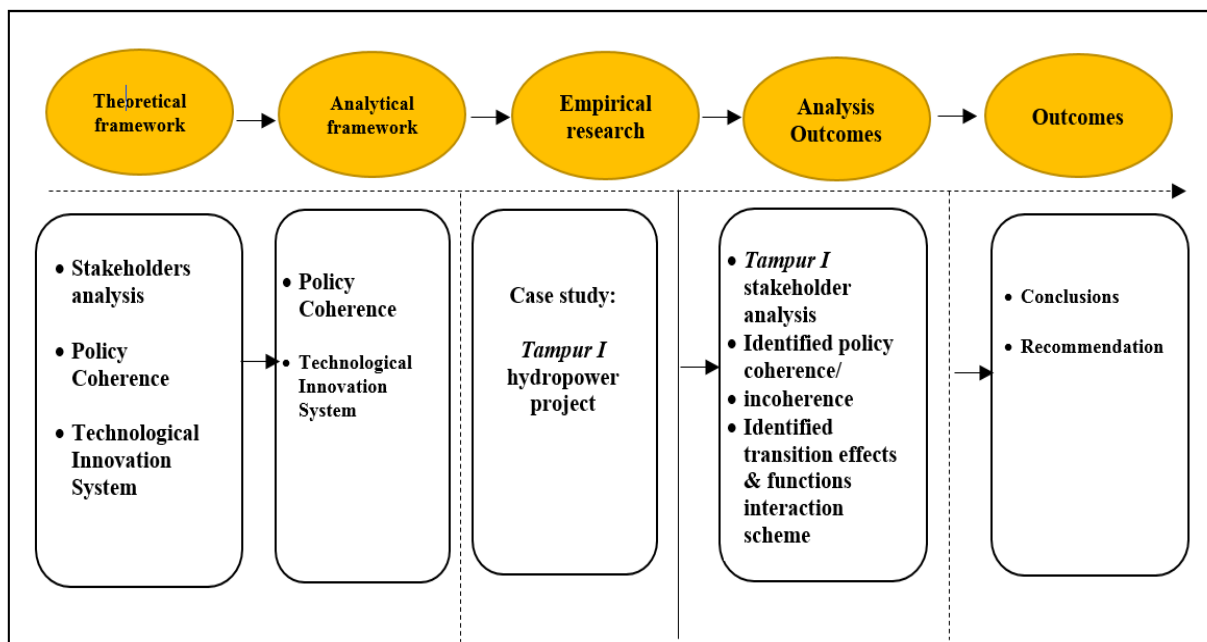


Figure 4. Research framework (adopted and changed from Isakhanyan, 2011)

3. Analytical framework and methods

This chapter sheds a light on the analytical framework and methodology used in to achieve the objective of this study. This chapter consists of two separate sections, which are analytical framework and methodology. Analytical framework section points out the theoretical knowledge and analysis process applied in this study. The section of methodology comprises the detail of tools and methodology used in this research starting from case study selection, data collection, and data analysis.

3.1 Analytical framework: policy coherence for triggering the implementation of the transition process

The analytical framework of this study is the combination of the existing theories of knowledge and study literature in the previous chapter of theoretical framework (see Chapter 2.2). Building the theoretical framework, this study primarily performs two stages of the process that are vital in the analysis of socio-technical transition (see Fig 4.): (1) the coherence analysis of the interplay of policies; (2) the dynamic functions influencing the implementation process of *Tampur I* hydropower.

In the first stage, on identifying the implementation process of *Tampur I* hydropower, this study uses stakeholders analysis (Michell et al., 1997; Brugha and Varvasovszky, 2000; Reed et al., 2009), as it sheds a light on the extent to which the involvement of actors according to their level of interest and influence on their actions and positions towards the implementation process of *Tampur I* hydropower. As a large-scale project, *Tampur I* hydropower involves various numbers of stakeholders which leads to the stakeholder analysis to identify their interests and influence towards the development project. The interest groups of stakeholders have vital roles in influencing the policy process and change (Grossmann, 2012). The stakeholder analysis focuses on identifying the key stakeholders involved in the development process of *Tampur I* hydropower.

Still in the first stage of analytical process of this study is analysing the degree of policy coherence that relates to *Tampur I* hydropower development study process (Nilsson et al., 2012) from the perspectives of the interviewees (Huttunen et al., 2014), as it provides TIS framework with a comprehensive list of either triggering or hampering policy instruments to the implementation process of *Tampur I* hydropower (Huttunen, 2015). The policy coherence analysis is performed in two stages, which are an analysis of policy coherence from the

perspectives of actors and analysis of innovation effects of policy coherence (Huttunen et al., 2014)

As TIS is composed of the structural components (actors and institutions) in the overall socio-technical transition, policy coherence analysis becomes an intermediary framework to TIS approach (Lukkarinen et al., 2018). In the field of stimulation and development of technological change, the socio-technical implementation process involves different types of policy instruments from different policy domains (Kivimaa and Kern, 2006). The involvement of multiple sectoral policies also implies in the development process of *Tampur I* hydropower. In this research, I looked at *Tampur I* hydropower development from interplay of four sectoral policies

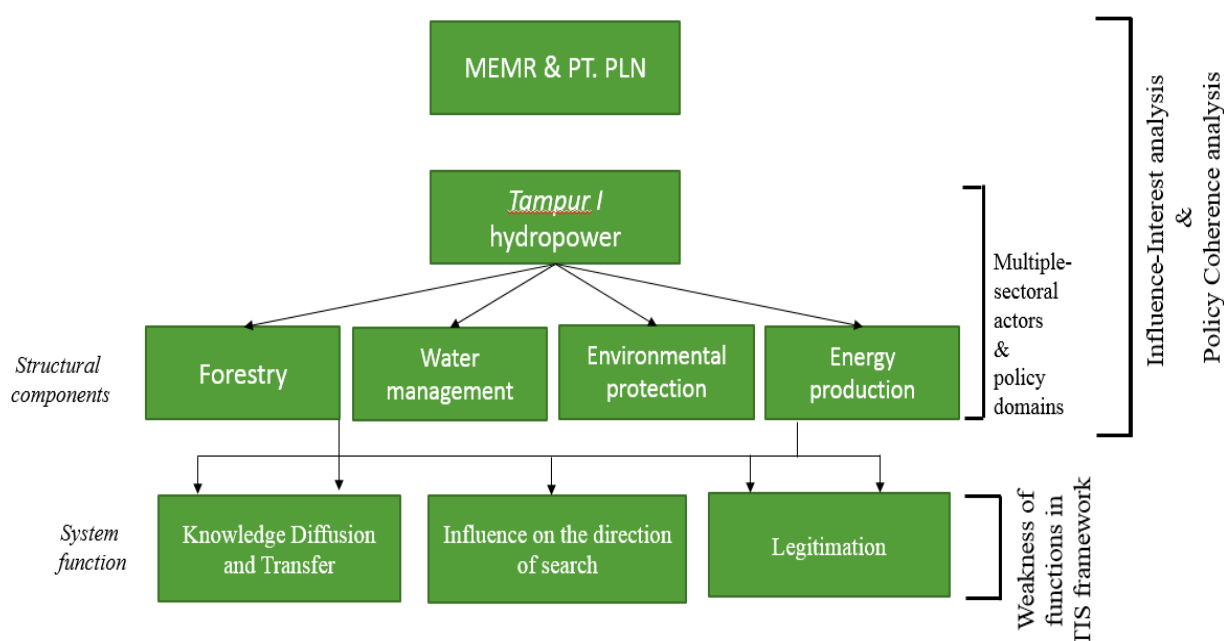


Figure 5. Analytical framework of the study

The selected relevant policy domains in this study consist of (1) forestry, (2) water management, (3) environmental permit and protection, and (4) energy production with several numbers of policy instruments. These four relevant policy domains are selected according to the result of in-depth expert interviews and direct observation conducted in the study field. The consideration of determining these four relevant policy domains is primarily based on the direct involvement of policy domains in the implementation process of *Tampur I* hydropower, in terms of administrative and technical involvement. After selecting the policy domains, I identified all the policy instruments and the effects mentioned and elaborated by the interviewees from each of policy domains that relate to *Tampur I* hydropower.

I do analysis of policy coherence using dimensions of policy coherence analysis by Huttunen et al. (2014) and Nilsson et al. (2012) which primarily include three components of policy coherence analysis, which are (1) internal, (2) temporal, and (3) external policy coherence through focusing on policy goals, policy instruments, and policy implementation from each domains. Policy internal focuses on identifying the coherence of policy goals and instruments within the same policy domain (Huttunen, 2015). As well as, analysing to what extent the policy instruments are properly implemented in practice to trigger the development process of *Tampur I* hydropower. Mapping the involved stakeholders into four categories (Bryson, 2003; Reed et al., 2009; Bawole, 2012) aims to identify to what extent the position and interest of stakeholders may change and influence the implementation of policies and regulations (institutions) as the structural components of TIS approach (Bergek et al., 2008) with regards to the renewable energy transition in Indonesia, such as the case of *Tampur I* hydropower development.

The first step is inventorying the policy objectives from each domain. Analysing policy coherence shows how sectoral policy goals, instruments and implementations interact with each other with policy influence on stakeholders' decisions. Through this analysis step, this study gets the comprehensive view of policy objectives of sectoral policies in different policy areas that relate to renewable development in Indonesia. As the implementation process of *Tampur I* hydropower in regional level is influenced by the policy goals and instruments in the national level. The second step is screening the policy instruments in every related policy domains. The identification of policy instruments is conducted within the same and between the policy domain by comparing one policy instrument to either policy goals and policy instruments. The third is identifying the policy implementation in every policy domains to see if policy goals are instrumented well in the implementation level. The policy coherence analysis in this study will focus on actors' perceptions. They can give an understanding of which policies are relevant and related to their activities, the impacts of the policies in the implementation level to them, also policy process from the goal to the outcomes. to avoid vague policy goals (Huttunen et al., 2014). To understand the policy coherence in the analysis, the strength of interactions between policy domains are scored likely direction as strong synergy (+) and weak synergy (-) as a precursor for further analysis (Nilsson et al., 2012).

The second stage of the basic process of analytical framework lies in TIS approach. This research mainly deploys the TIS framework to identify the dynamics functions that influence the development process of *Tampur I* hydropower. In TIS framework, it is important to define

if a project or a case is considerable as a transition system (Jacobson and Bergek, 2011; Kivimaa and Kern, 2016). Markard et al. (2012) also conceptualized that a system consists of networks of actors, including individual and organizations) and institutions, including policies, regulations, the standard of operations, and societal and technical norms in the societal practices. Referring to the findings in the previous researches in the theoretical chapter, *Tampur I* hydropower is categorized as a socio-technical system as it consists of multi-actors and multi institutions in determining the implementation of the socio-technological transition process from non-renewable to renewable energy production. I used TIS in this study to analyse the effects of policy coherence in different system functions by the interviewees. The analysis of TIS is to identify and find in which functions that policy-makers have to pay attention in order to trigger the socio-technical transition process (Huttunen et al., 2014)

In the analytical framework, there are three selected functions used in the TIS approach in the case of *Tampur I* hydropower: (1) knowledge diffusion, (2) influence on the direction of search, and (3) creation of legitimacy. The other system functions were omitted from the TIS analysis because the scope of this study particularly takes place and focuses on one specific case study in one specific region study. I drew this study focusing on the local spatial level, as the finding of Markard et al. (2015) shed a light that it is important to draw the TIS boundaries and the boundaries are not limited to merely one place but in different places. Despite in general the interest of this research is to identify the triggering and hampering policy factors in the renewable energy transition in Indonesia, yet that specific renewable energy transition case focuses on the components of the implementation process of *Tampur I* hydropower development that directly relates to local stakeholders. Huttunen et al. (2014) in his study omitted the function of positive externalities from the Biogas production effects examination, since the issue of external policy coherence identified the externalities by definition. Following the framework built by Huttunen et al. (2014) in conducting bottom-up TIS analysis by involving all stakeholders' perspectives, *Tampur I* hydropower includes the functions that are directly related to the experienced policies by local stakeholders. The issue of knowledge development, entrepreneurial, market entry, and resource mobilisation functions have been passed through and insufficient. As within the TIS framework, social factors and local-level interactions are weakly included in (Dewald and Truffer, 2012), this study focuses on TIS approach from the perspectives of all involved actors. By combining TIS and stakeholders' perspectives, this study develops a shared analytical framework by focusing on functions of diffusion of knowledge, influence on the direction of search, and legitimacy that deal with local

perspectives and have effects on and beyond the public actions (Lukkarinen et al., 2018). As Markard et al. (2015) in the finding argued that a particular technology no needs to necessarily be justified with policy support to conduct TIS analysis.

3.2 Stakeholder Analysis

Stakeholder analysis is an approach to understand the inclusion of stakeholders in an organization or management and determine the relevancy of involved stakeholders to a policy regarding interest, position, and influence (Brugha and Varvasovsky, 2000). Stakeholder analysis is used to interpret the dimensions of interactions, such as the relationship between stakeholders, relationship of each of stakeholders to the existing system, and the priority given to each view of involved stakeholders (Sharp et al., 1999). Stakeholder analysis has been developed to understand the interest and influence of actors (Brugha and Varvasovsky, 2000). Yet, in terms of policy, development, and management of natural resources, stakeholder analysis attempts as an approach to empower the inclusion of marginal or less powerful stakeholders in influencing decision-making processes (Reed et al., 2009). Stakeholder analysis aims policy-makers to understand a dynamic policy sub-system and the potential effects and map the multiple activities, strategies, and multiple authorities of various stakeholders in multiple venues (Weible, 2006).

Stakeholder analysis is a procedure to recognize who the key stakeholders are in the system, for example, who dominantly affect, and/or are dominantly affected by, set of policies, actions, and perspectives within the system toward a problem (Grimble and Chan, 1995). In order to identify the key stakeholders, according to Mitchell et al. (1997) and Brugha and Varvasovsky (2000), stakeholders analysis consist of several stakeholder attributes, which are power, legitimacy, urgency, interest, and influence. Stakeholders who have powerful influence how they can gain the access to dominate and impose other stakeholders within the system (Mitchell et al. (1997). Santana (2012) perceives an aspect of legitimacy as a socially constructed attribute which a stakeholder or an actor has to be legitimate in a broad societal perception. Santana (2012) sheds a light that there is a relationship between legitimacy and the level of power of stakeholder, in which the combination of both can create an authority (Mitchell et al., 1997). Vested interest is defined as the possession of one or more following stakeholders attributes which determine the engagement of stakeholders to a particular issue of the problem (Olander, 2007). Many definitions of attributes used in prior studies, yet in this study, I adopt a set of combined stakeholders attributes from the study of Mitchell et al. (1997),

Brugha and Varvasovsky (2000), and Santana (2012). Ruggiero et al. (2014) carried out a study to identify the interplay of stakeholders influence in order to understand the influence affected by the stakeholders to the development of renewable energy project and vice versa.

3.3 Methods

3.3.1 Selection of case study: *Tampur I* hydropower

This research in the area of *Tampur* river and *Lesten* village, Pining sub-district, *Gayo Lues* district, Aceh province. *Tampur I* hydropower was selected as the case study of this research. It is an area of 2 kilometre square or about 200 hectares from the capital sub-district, namely *Desa Pining*. Meanwhile, the distance from capital district of *Gayo Lues*, which is *Blangkejeren* city, is 58 kilometres. *Desa Lesten* consists of 67 family units (*Kepala Keluarga*) (LC1, 2018).

Tampur I is a hydropower project which is located in the area of *Tampur* river and *Lesten* village, Pining district, *Gayo Lues* regency, Province of *Aceh*. It is an area of 2 kilometres square or about 200 hectares from the capital sub-district, namely *Desa Pining*. According to RUPTL 2017 and 2018, *Tampur I* hydropower is listed as large scale hydropower under the government power supply business plan of 2017 that is always updated every year by and under the authority of MEMR. According to RUPTL 2017, the total capacity of *Tampur I* hydropower is 428 MW and estimated to be completely finished in 2023. This project is part of the plan of government to achieve the average target of additional capacity in 2,1 GW per year with hydropower/micro-hydro/pumped storage, which contributes to 5,3 GW or 25,1 percent of the total average of renewable energy transition target.

Tampur I hydropower hits three different status of forest areal, which are protected, production, and APL forests. This hydropower takes 4.090 hectares of land in total for puddle area due to the construction. The area of the protected area is estimated approximately 1200 hectares, around 2500 hectares of production forest, and other uses of forest area take up around 290 hectares which relocate local people living in and surrounding *Lesten* village, *Gayo Lues* district (WALHI, 2017). According to the observation and interview with the local people, the economic livelihood activities of people in *Lesten* depend on the natural resources in and around the river and the forest areal. Besides agriculture and plantation, they depend on non-timber products from the forests, such as nest swallow and honey, catching the fishes (see Fig.6) and riding a boat in the river as their transportation mode for birds and deer hunting along the rivers and forests (WALHI, 2017).



Figure 6. Current activities around location site of Tampur I hydropower

This project has been starting the pre-construction phase since the beginning of 2017 by foreign IPP from Hong Kong named *Kamirzu*. Despite *Tampur I* hydropower is constructed by the private investor, this project is taken into account as Government planning of additional power plant capacity in the Sumatra region. It is officially registered as one of the projects in the MEMR Regulation No. 40/2014 which covers accelerated electricity power plant project using renewable energy sources. The status of *Tampur I* hydropower in 2018 is still in the phase of pre-construction in which the activities consist of survey, administrative and technical permit procedures, and environmental permit assessment (RG3, 2018; LC1, 2018). After considering those socio-economic and environmental impacts that might be occurring, the reason behind choosing this case study is because it is interesting to look at as the part of energy policy coherence and identify the bottleneck of renewable energy development and transition across regions in Indonesia.

Since this is the large-capacity hydropower project, it involves different sectoral ministries. Hence, there are a lot of administrative permits from each of ministry that have to be fulfilled by *Kamirzu* before the construction phase is started. In August 2017, *Kamirzu* has proceeded the recommendation and permit from the provincial government of *Aceh*, which is one year valid of principle permit of the Acehnese governor. Through this permit, *Kamirzu* is already allowed to start the pre-construction phases in the site. If this permit is not approved yet, *Kamirzu* is not eligible to start the construction project except pre-survey of relocation areas for local people.

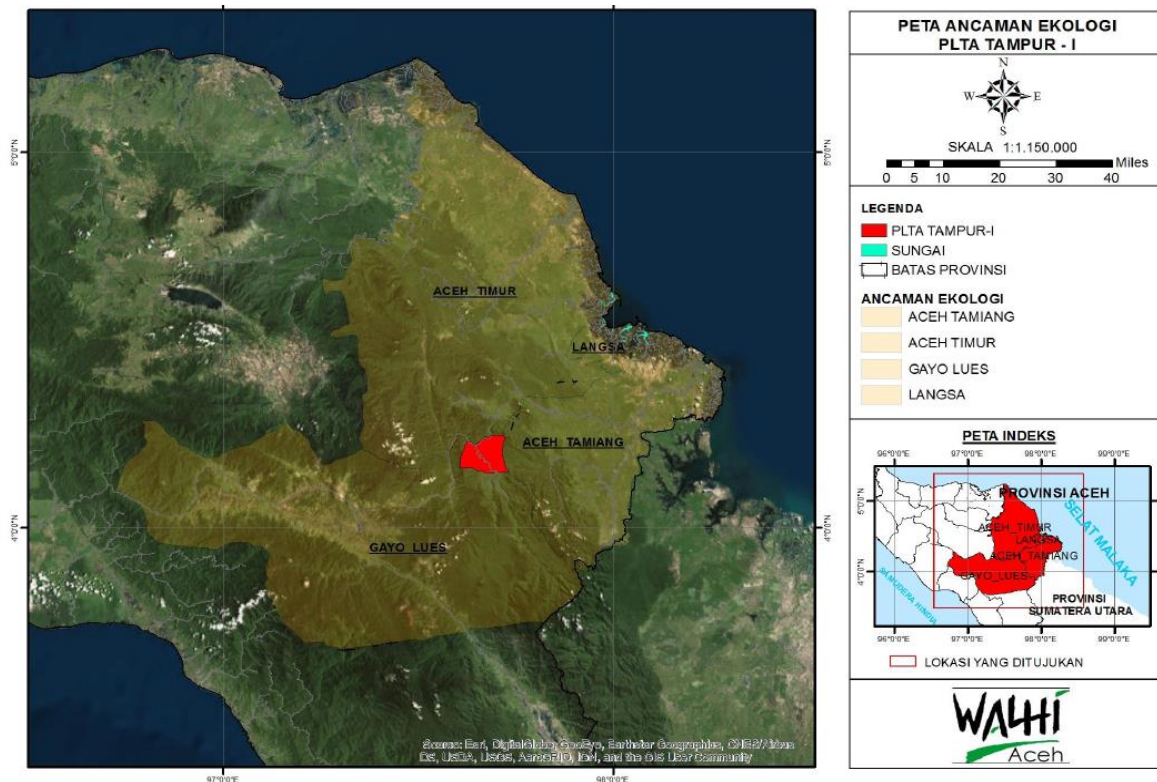


Figure7. Location map of Tampur I hydropower from Google Maps (WALHI, 2017)

Multi-sectoral policies also involve in the development process of *Tampur I* hydropower. In this study, the policies that are going to be assessed come from two related sectors to this case study, which are renewable forestry, environment, water management, and energy policy in national level. The selection of these sectors considers their importance and influence in the national and regional policy agenda, also relevant to hydropower plan project in Indonesia, according to the expert interviews.

The development process of *Tampur I* hydropower is listed as a national governmental project but taking place at the regional level. That status leads *Tampur I* hydropower involves national and regional stakeholders in the implementation process. That condition engenders different perspectives and perceptions towards the development of *Tampur I* hydropower. Several divided groups either coalition or opposition to the development process of *Tampur I* hydropower. For example, protest from the local community and local environmental NGOs, like *Harimau Pining*, *WALHI Aceh* and *Tamiang Peduli*.

The development project of *Tampur I* hydropower may also create negative social and environmental externalities, since this project covers the protected forest area with the richness of biodiversity and intangible community assets. In terms of environmental impacts, *Tampur I* hydropower will impact on land use change, environmental sanitation, river water discharge,

terrestrial vegetation change, decreasing river water quality, disturbance of terrestrial fauna, and river biota. From the social impact, the operationalization of this project potentially impacts on altering livelihood, perception, and behaviour of local people, health threat increasing noise during the construction and commissioning processes (EIA *Tampur I* hydropower, 2018). As a result, the covered area may hamper fresh water supply from the *Tamiang* river, fishes, and non-timber products as the sources of livelihood. This hydropower project building will influence to the change of water river flows which increases the flood potential in upstream areas, such as East *Aceh* and *Tamiang Aceh*. Not only those areas, but drought also occurs in the downstream areas like *Lesten* and *Blangkejeren*. (Hanafiah, 2017). Multi-perceptions emerge among the local stakeholders in particular local NGOs and local government, since *Tampur I* hydropower is categorized as the private project, so the government's involvement is not necessarily significant within the site in practice (RG8, 2018). For example, if there are other non-forestry activities like mining by *Kamirzu*. The different assumptions drive to potential social tension from non-state organizations like *Harimau Pining* and WALHI in defining the urgency of *Tampur I* hydropower development.

Due to the limited time-frame, difficult access and lack of infrastructure to the whole areas of site, this research only focused and observed at the main hydropower plan area of *Tampur I* which is located in *Lesten* village.

3.3.2 Data collection

This section mainly points out the types of method to collect the required data of this study. This thesis research used different methods to answer the research questions which consist of, experts interview, survey, and literature review. The research used qualitative method research as the main tool to get more perspectives and interpretations into the problem from different stakeholders (Mac Donald, 1999).

This research primarily used qualitative research methods, which consisted of primary and secondary data to answer the research questions. The data collection period of this study was started from March to April 2018 and lasted for approximately two months in a row. Following the research objective, this research collected information from the involved actors with the different position and interest towards the interplay of relevant policies in *Tampur I* hydropower as one source of data. This research analysed the policy instruments from each of policy domain that relate to the implementation process of *Tampur I* hydropower. The selected

policy instruments of this study were chosen according to the expert interviewees from selected relevant sectoral institutions.

Table 1. The operationalization of Tampur I hydropower research

Methodology	Actors/stakeholders	Research Question	Purposes
Unstructured in-depth interviews	Non-state actors	RQ 1, 2, 3	<ul style="list-style-type: none"> • To find the stakeholders involvement in <i>Tampur I</i> hydropower • To find stakeholders' interest, influence, and positions toward <i>Tampur I</i> hydropower • To find if stakeholders oppose or support <i>Tampur I</i> hydropower and the actions or manners • To find out the potential impacts and/or benefits of <i>Tampur I</i> hydropower to local people • To find the communication between local people and government • To find the level of understanding and knowledge of local people about the project
Semi-structured in-depth interviews	State actors: MOPW MOEF MEMR PLN Regional Governments	RQ 1,2,3	<ul style="list-style-type: none"> • To find the stakeholders involvement in <i>Tampur I</i> hydropower • To find stakeholders' interest, influence, and positions toward <i>Tampur I</i> hydropower • To find if stakeholders oppose or support <i>Tampur I</i> hydropower and the actions or manners • To find the policy objectives of each domain • To find the policy instruments of each domain • To find the procedurals with regards to <i>Tampur I</i> hydropower • To find the task divisions and functions of institutions with regards to <i>Tampur I</i> • To find communication and co-ordination between one institution and others • To find if they support or oppose <i>Tampur I</i> • To find out the actions or manners
Observation	Livelihood practices Daily conversation among local community and NGOs Construction site	RQ 2,3	<ul style="list-style-type: none"> • To find the communication and co-ordination among stakeholders • To find the implementation of policy instruments

			<ul style="list-style-type: none"> • To find the progress of <i>Tampur I</i> hydropower • To find if there is divided coalition in <i>Tampur I</i> hydropower development • To find current situation and daily livelihood of people in <i>Lesten</i>
Secondary data	Legal documents and reports from governments and NGOs Internet (news, articles) Scientific articles and journals	RQ 1,2,3	To find additional legal/written proofs to support the research

The table 1 above summarizes the components of the research operationalisation which consists of the methodologies used, sources of information, categories of answered research questions, and the expected outcome of the research. The table depicts the approaches that are used in this study to gain the right data from the right sources to answer the right research questions.

As this study focuses on the implementation of policy instruments, this study conducted several types of data collection methods to gain the required information about the background of the *Tampur I* hydropower project. This research involved not only from the experts or legitimate actors, such as national and local government, also non-state actors in the data collection process. The data collection methods used in this study consist of (1) semi-structured and in-depth interviews, (2) observations, and (3) study literature. Below I elaborate the detailed information of each of method I used during the data collection period of this study.

3.3.3 In-depth Interview

The primary data collection method of this research is the in-depth interview. This research consists of informal and semi-structured interviews. The interviews of this research were divided into two categories of interviewees, which are (1) expert interview and (2) non-expert or lay people interviews. The interview took place in the location of *Tampur I* hydropower which was *Gayo Lues* regency, *Lesten Gampong* or village for two months. The length period of interview comprised one month for the interviews of local stakeholders in *Gayo Lues* and the rest of one month for top governmental interviews. The interviews took approximately 1-2 hours per each of respondent.

Interviews can be perceived as the casual daily conversation, but positioning the researcher as the person in charge of questioning more and being more initiative to start the conversation (Qu, 2011). To gain the stakeholders-related information in the development process of *Tampur I* hydropower, this study applied semi-structure interviews with snowball technique from one stakeholder to other stakeholders. The approach of open-ended and closed-ended questions depended on the interviewees. Open-ended questions were mostly asked to the local and non-state stakeholders to encourage full and elaborated answers. The unstructured interviews were also conducted with the local people living within and around Desa *Lesten* who get the impact from the development of *Tampur I* hydropower. This is because this study would like to get more insights of what occurs in the level of policy implementations from the experienced policy by the stakeholders, either state or non-state actors.

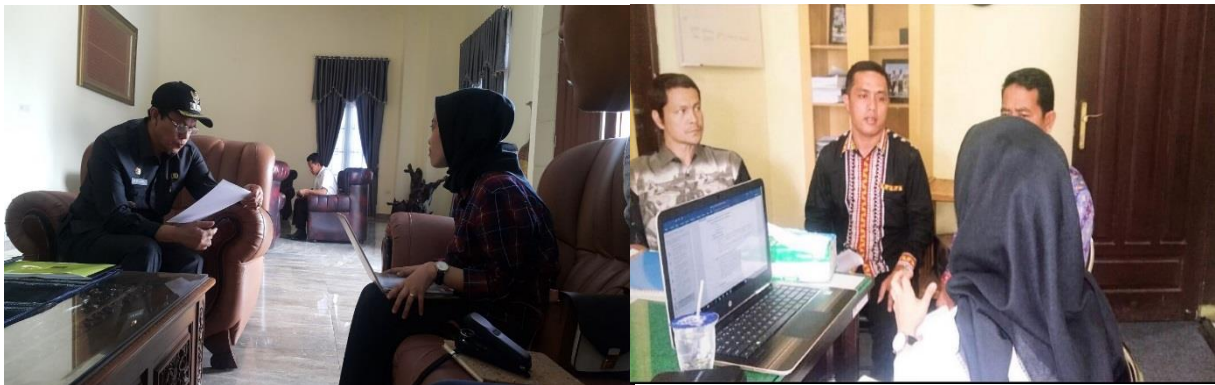


Figure 8. In-depth interview with Head of Gayo Lues (left) and Environmental Service office of Gayo Lues (right)

The interviews were taken in Bahasa language, as a national language of Indonesia. In the scope of this research, to aim to communicate and translate the conversation, I was accompanied by two local people during the interviews with local people, as most of *Lesten* society still speak in their local languages. The selection of local people to be interviewed was randomly chosen under the information and assumption that were local people had adequately same information with regards to the *Tampur I* hydropower development. The interviews were recorded with the permission of the interviewees, either state actors or non-state actors. The summary of transcriptions has been made for all recorded interviews.

Table 2. List of interviewed stakeholders in Tampur I hydropower

Stakeholder groups	Interviewed individual members	Institutional level	Interview date
Ministry of Forestry and Environment	head of sub-directorate general of planology and environmental governance	National government	05/04/2018
	official staff of sub-directorate general of planology and environmental governance	National government	05/05/2018
	secretary of technic cooperation	National government	07/02/2018
	head of sub- directorate general of forest environmental services utilization and conservation	National government	12/02/2018
Ministry of Energy and Mineral Resources	head of sub-directorate general of diverse new and renewable energy	National government	19/03/2018
	official of directorate general of new and renewable energy	National government	14/02/2018
Ministry of Public Work	head of sub-directorate of water resources use	National government	06/03/2018
	head of sub-directorate of dam area	National government	06/03/2018
PLN	deputy manager of new and renewable energy division	National government	28/03/2018
	officer of land and use division	National government	05/04/2018
	officer of environment division	National government	02/04/2018
Local government	regency head	Regency government	20/03/2018
	senior officer of forest management unit	Regency govenrment	21/03/2018
	senior officer of environmental services	Regency govenrment	21/03/2018
	head of subdivision of regional development agency	Regency govenrment	24/03/2018
NGO	head of organization	NGO	26/03/2018
	vice president of organization	NGO	26/03/2018
Local community	village chief	Community	27/03/2018
	2 project workers	Community	29/03/2018

Table 2 above lists the number of stakeholders from the different level (state and non-state actors) with different number of interviewed interviewees (snowball sampling). There are 19 interviewees interviewed in this research in total. The state actors involved in this research are (1) MEMR, (2) MOPW, (3) MOEF, (4) PLN and (5) Regional governments. The non-state

actors consist of (1) local NGOs: *Harimau Pining* and *Walhi Aceh*, and (2) *Lesten*'s people. Central governmental institutions, such as MEMR, MOEF, MOPW, and PLN are categorized as the experts and competent respondents in this research to provide the information with regards to policy objectives, instruments, and national energy programs. The expert interviews were conducted to respondents who have the strategic position in the institutions, for instance, head of organization, vice head, the person in charge of a project, or senior officials. The interviews with state actors or experts were conducted in snowball sampling until reaching the expected outcomes of the interviews (saturation point). Through semi-structured interviews, not only the researchers can ask the questions based on their perspective, but experts or key informers can also have chances to elaborate and explain more issues using the open-ended questions according to the guideline (Alsaawi, 2014). Therefore, it covered information about the objectives of policies in different sectors (renewable energy, forest conservation, water management, and environmental protection).

3.3.4 Observations

Besides doing the interviews with the local community and decision makers at the local and national level, the second primary data collection method in this research is doing the observations. The benefit of observation is that the researcher can see people behave and act natural because they do not know they are under observation (Centres for Disease Control and Prevention, 2008).



Figure 9. Informal community gathering

This study applied direct observation to watch the interactions and daily livelihood of local people. The observation is categorized as direct observation, since I introduced myself and explained in what purpose I was there to the local people and asked permission to stay there. Within this way, I asked the questions open to the local people with regards to their responses toward the development of *Tampur I* hydropower development. The observation took place for less than two weeks in *Gayo Lues* regency and two days in *Lesten* village. As local people were quite shy and not too opened to outsiders, joining their informal gathering for a few times helped me to engage with the local community and made them more opened in the interview process.

Due to the unsupporting weather and rainy season during my stay, I visited the construction site for two days, since the infrastructure and transportation were lacking there. It was not possible and dangerous to go through all the ways to and visit the construction site in the raining and in the evening. During my visit, I communicated with groups of local people and *Harimau Pining* by starting the conversation informally. Following the activities of some groups of local people, for example joining them to go to the markets or merely sitting and drinking in the local people's small coffee shops. The agricultural activities were not running during the time I visited, as the rainy season took so long and people could not plant. From the observation, I got the new information with respects to the daily activities of local people, either activities during their working hours or leisure time after work.

3.3.5 Literature review

Literature review is the important thing that I had been doing since the proposal writing until the result writing. At first, I did study literature with regards to the general policies and regulations influencing energy production in Indonesia. Before doing the fieldwork, I enriched myself with the information regarding *Tampur I* hydropower development project to prepare several lists of questions for the interviews and map numbers of potential stakeholders that involve in. In this step, the collection of secondary data that can support the research before doing an interview to understand the background and status quo of *Tampur I* hydropower development.

3.3.6 Data Analysis

After collecting information from the field was done in the previous section, I started to interpret, analyse, and review the existing information. To scientifically support and complement the validity of collected data, I had study literature that are relevant to this research

focus. I looked back at the research questions and did the study literature according to research objectives. For example, collecting the literature and theoretical knowledge about: (1) stakeholders analysis in technological change, (2) policy coherence in sustainable transition, and (3) socio-technical changes using TIS framework. Next, interpreting and analysing using the supporting theories and analysis tools in policy coherence and TIS framework to get closer to the conclusions with the conceptual framework that has been set in the previous chapter to limit the research focus.

In policy coherence analysis, the collected data from policy documents and experts interviews are compared. The policy objective from each sector is written in the policy document. Then, collected information from the expert interview referring to the question lists is compared to the collected information from policy document. The comparison is to identify if the policy objective in the policy document has been achieved according to the actors (expert) perspectives. Subsequently, the TIS method includes a review of a national and regional relevant policies, statistical maps, and official letters. I gathered the information from the literature and took a note at important points of the collected literature. The analysing of using TIS framework is by taking notes and emphasizing policy objectives and instruments which are mismatched with the implementation process according to the expert interview result. The next chapter starts discussing briefly the identification of the involved stakeholders in *Tampur I* hydropower and how each stakeholders influence the development process of *Tampur I* hydropower project.

4. The involvement of stakeholders in the development of *Tampur I* hydropower

This chapter briefly discusses the stakeholders who are involved in the development process of *Tampur I* hydropower and the extent of the stakeholders involvement in the implementation process. The involvement of stakeholders is perceived from the level of power they possess, the interest level, and the positions towards *Tampur I* hydropower, whether they support or oppose the project. This chapter shows how each involved stakeholders' perspectives on *Tampur I* hydropower and the relationship between power degree, interest, and positions of stakeholders towards the development process of *Tampur I* hydropower.

4.1 Stakeholder perspectives on *Tampur I* hydropower

This section briefly identifies and describes who stakeholders are relevant in the development of *Tampur I*, what their interests and influence toward the issue, to what extent their roles influence the development of *Tampur I* hydropower process and how the networking among the involved stakeholders influences the *Tampur I* hydropower building. This paper conducts the identification of involved stakeholders referring to different elements of stakeholder analysis, which are nature of interest; to what extent the focus of interest or stake of each stakeholders from their organization's roles, and the level of power they hold perceived from the authority and power to issue a regulation, position in the legal organization structure, and the ability of providing information and resources (Reed et al., 2009).

Energy sector has been the concern in developing country, such as Indonesia that mostly depends on fossil fuels for approximately 85 percent (MEMR, 2017). It is proven by Indonesian government's strategy action in carrying out a comprehensive National Energy Policy to reach renewable energy production at 23 percent of total energy mix by 2025. That national plan involves the management of renewable energy from all different levels of governments, from national to regional. National Energy Plan encourages the integration between government and non-government institutions in managing the new and renewable energy sources that are potentially spread all over areas of Indonesia. Indonesian renewable energy plan is not merely limited to the energy resource management in one particular area, but covering all potential areas in Indonesia which requires the co-operation between multi-sectoral institutions (National Development Agencies, 2012). That means, energy sector comprises multi-stakeholders perspectives from officials or ministries with several steps, such as planning, preparation, construction, until monitoring and evaluation process, and non-governmental organizations, including the community.

4.1 Identified stakeholders involving in *Tampur I* hydropower development process

Tampur I hydropower involves stakeholders from different sectors and levels. In practice, it may influence the length of bureaucracy process to complete *Tampur I* hydropower project. Though there is specific definitions of what kind of entity defined as a stakeholders, S. Reed et al. (2009) stated that the literature debate lies on that is because the author do not categorize in which and why stakeholder has legitimacy over others. Hence, in this paper, these categorizations makes explicit assumptions about the legitimacy of stakeholders. Following the suggestions from Freeman and Miles (2002) that is important to distinguish between legitimate and illegitimate stakeholders. That aims to ensure that all varied stakeholders from different levels are included in the stakeholder analysis. This research categorizes all the involved according to their nature of interest, level of power, and legitimacy (Mitchell et al., 1997). This section classifies the involved stakeholders based on their level of legal structural position in order to subsequently perceive and aim mapping the level of influence and interests in the development of *Tampur I* hydropower. The stakeholders in *Tampur I* hydropower consist of national, regional, and local stakeholders, including governmental and non-governmental bodies or organizations.

Stakeholders in the national level are defined as the actors who position in the central official or ministry. These actors are legitimate to make set of policy and regulations with regards to renewable energy development in Indonesia which may influence and benefit from all relevant projects, like *Tampur I* hydropower. National level stakeholders also set the national and regional targets of renewable energy production in Indonesia that have to be complied with all provinces and regions. Those stakeholders can also do the amendments upon the laws and regulations that are relevant to renewable energy programs and have legitimations to provide source of information and allocation budget to manage the renewable energy sources. According to identification and interview in the field, the central officials that have direct involvement in *Tampur I* hydropower consist of Ministry of Environment and Forestry (MOEF), Ministry of Energy and Mineral Resources (MEMR), Ministry of Public Work (MOPW), and PT. PLN (Persero). These central government bodies come from different sectors and interests to work with *Tampur I* hydropower development. One government body or institution structurally consists of divisions and sub-divisions with different roles and responsibilities. Hence, the complexity of interrelationship between divisions within same institution may influence on how one stakeholder positions the urgency of the *Tampur I* hydropower development. Besides policy and regulations maker, one governmental unit

business, PLN is also the one who responsible as a single buyer of electricity energy produced by *Tampur I* hydropower from Independent Power Producer (IPP) or investor. So, the roles of central governmental bodies in *Tampur I* hydropower development is vital in which permits to build *Tampur I* hydropower are issued and approved by them.

Meanwhile, decentralization in natural resources management in Indonesia influences the power level, actions, and positions of how regional government participate in renewable energy development. Therefore, this paper categorizes regional stakeholders separately from national governments in order to perceive to what extent they are legitimate to act and the transfer power from central government to regional officials in the context of renewable energy development program. Within categorization of regional government, it helps this paper to know the extent to which central governments have decentralized their authority in terms of *Tampur I* hydropower development to the local governments based on the existing legal laws and regulations, and how are the co-operations between these central-regional officials. This paper divides involved regional stakeholders in *Tampur I* hydropower into three layers of bodies which consist of provincial, regency, and village government.

According to Article 4 Law No. 23/2014, in terms of provincial area, it is as an administrative area led by a governor and representative of central government in conducting general government affairs within provincial area. Meanwhile, regency government is administrative area below provincial level led by a head of regent or city. In *Tampur I* hydropower, provincial government consists of several service offices that focus on different sectors, including forestry, environment, and energy. They are legitimate to cover optional general affairs which forestry and energy & mineral resources are within it. These divisions of government affairs between central and regional governments are based on the principle of accountability, efficiency, externality, and national strategic interest. Within these divisions, central government still have authority over the regional government in terms of particular vital sectors that give influential impact to the national, cross-province and regency, including renewable energy resources and forests. Provincial government in *Tampur I* hydropower becomes the bridge between investor and regional government bodies below national level. They are also the ones who responsible for the regional level permits of *Tampur I* hydropower that have to fulfilled by *Kamirzu* as the investor. The involvement of provincial governments play necessary roles in ensuring that *Tampur I* hydropower benefits to the local community. The governor, as the head of province, represents the provincial government to issue the principal permit as the first door of investment for investor before starting the project. As the

governor election held in every five years, in the case of *Tampur I* hydropower, the transition from old to new governor of *Aceh* occurred and it influenced the permit process of *Kamirzu* to continue starting the project, since the principal permit is only valid for a year and need to be updated by *Kamirzu* every year. Different leader leads to different point of view regarding a particular project or program, which results in giving impact to *Kamirzu* in the development permit process from regional level.

Another group of stakeholders is the regency governments. As same as the central and provincial governments, in the regency level, they consist of different public services offices that focus on different domain. In the case of *Gayo Lues* regency, the relevant regency bodies with *Tampur I* hydropower are head of regent office, environmental services office and forestry office. Compared to the provincial government, the role of regency bodies is not that significantly influential to the development process of *Tampur I* hydropower. Their role is limited to be a facilitator and mediator between internal party, which is local community and as the external body that belongs to *Kamirzu* as the private investor. These regency government bodies are responsible in facilitating two different interests across the multi-stakeholders. The difference between the specific roles of provincial and regency government lies on the authority of each government bodies to issue permit and letter of recommendation. In the context of legal governmental structures, regency governmental bodies are not allowed to pull out and provide any letter of recommendation and permit document with regards to *Tampur I* hydropower development. Despite they are regarded as the official representatives of local people in *Lesten* village who are the most affected due to this project, they merely play role to be a communication bridge between local people and *Kamirzu* and do not have capacity to interfere the administrative and technical issues, including agreement and permit process.

Below regency level, village government takes a position closer to the local community. Head of village as the leader is the direct representative of *Lesten* people who involves in the meetings and survey activities. Village government has less official and legal task and responsibility compared to regency government as it has restricted tasks and responsibilities. According to law of regional government, village government has no significant authority in terms of natural resources management, including protected forest areal use which is still under the authority of provincial government supervised by central government. For example, village government is not permitted to assign and determine the status of forest areal for particular forest and non-forest activities. Besides assigning the forest areal status, village government has no authority and involvement to take a final decision upon the agreement or PPA between

PLN and *Kamirzu*. The roles of *Lesten* village governments consist of conduction seminars and providing information to local people in *Lesten*, but accompanied by regency government during the process. As more engagement with local community, head of village will deliver people's thought and perspectives towards the project to the regency government before meeting with *Kamirzu*. This situation requires strong co-operation and collaboration between regency and village government to be at the same perspectives. In one hand, village community open the discussion for local people directly, meanwhile the regency government will transfer what people in *Lesten* think about and respond towards *Tampur I* hydropower project.

Last category of stakeholder identified in the development of *Tampur I* hydropower is the group of local community which is those who live around and within *Lesten* village. In this research, those local communities are defined as the ones who get the impacts and benefits from this project.

4.2 Stakeholders' power, interest and legitimacy in *Tampur I* hydropower

The purpose of stakeholder analysis is to understand the relevance of stakeholders from different perspectives and their relevance to one particular project or policy (Brugha and Varvasovsky, 2000). Within stakeholder analysis, it aims the policy makers to conceptualize multiple strategies of multiple stakeholders to multiple participants in multiple venue in a dynamic policy subsystem (Weible, 2006). This perspective is important to help understand the shared authority among involved institutions and actors in terms of legality process of *Tampur I* hydropower with different policies and regulations issued by different ministries. Most researches with regards to stakeholder analysis address the similar set of questions, for example who stakeholders are involved in, what and why their interests should be taken into account, what and how their power of position can influence the direction of decisions regarding a project or policy, how the coalition is formed among the stakeholders, and what each of stakeholder's actions or strategy to lead the collective goals following their common interests (Brugha and Varvasovsky 2000; Crosby 1991).

In the stakeholder analysis, there is a need to identify and distinguish the stakeholders power, interest and influence around the existing policies that are relevant to an issue (Brugha and Varvasovsky (2000). Therefore, this sub-chapter of thesis describes the analysis of involved stakeholders in *Tampur I* hydropower in the context of interest and influence (Reed et al., 2009). This analysis use indicators for each of interest and power and legitimacy (Reed et al., 2009;

Mikalsen and Jentoft, 2001) in order to measure the levels based on the stakeholders interview and the participatory observation in the field.

In terms of power degree analysis of stakeholders, the used indicators in this research are regulation, legitimation, and information and resources. Regulation means how one organization or institution could issue and reform policy a priority which may affect the implementation of the issue in practice. In the context of legitimacy, Santana (2011) in the research mentioned that legitimacy as entity, claim, and behaviour presented together. I assume that stakeholders with legal power position in the societal system may also have legitimacy of claim and behaviour depending on the societal perceptions and stakeholder's interaction in case of *Tampur I* hydropower. As an example, local environmental NGO, *Harimau Pining* (see Table) or head of *Lesten* village who is perceived by the society as the leader of community and intensely interact with local people. Therefore, legitimacy of stakeholder is defined as a 'social acceptance', indeed socially constructed that dynamically changes at vary time (Santana, 2011). Another indicator using to measure the degree of power of stakeholders is also perceived on how stakeholder is able to provide the information and resources, such as budget and human resource in the development of *Tampur I* hydropower.

I do this classification of stakeholders to identify how involved stakeholders engaged each other in *Tampur I* development. Within the qualitative mapping analysis based on the level of interest-influence, the involved stakeholders groups could be identified in four categories (as explained in chapter 2), which are: (1) Key Players, (2) Context Setters, (3) Subjects, and (4) Crowd (Bawole, 2012). Key players are the ones who have high level of interest, power and positive support towards *Tampur I* hydropower project. In contrast, stakeholders categorized in crowd are the ones who have low level of power, interest, and tend to oppose the development project of *Tampur I* hydropower. Subjects are those who put high interest on *Tampur I* hydropower project but having limited power degree to control the development process and weak supports to *Tampur I* project. Last but not least, context setter group is for those who possess high level of power, yet put less interest on *Tampur I* hydropower project. Once stakeholders in this category oppose the project, they can strongly against the development process of *Tampur I* hydropower.

Through these classification, this paper is able to identify the positions and attributes of each stakeholders towards the project and decision-making process, if they passively or actively contribute to the project progress development (Olander, 2007). The table below draws up the stakeholders map of *Tampur I* hydropower development. Each involved stakeholders is

positioned in each stakeholders category based on the level of interest, power, and positions of stakeholders towards the development process of *Tampur I* hydropower.

Table 3. Stakeholders table with nature of interests and degree of powers

Name of stakeholders	Nature of Interest		Level of power			Stakeholders category
	Focus of Interest	Organisation's role	Regulation	Legitimation	Information & Resources	
Ministry of Forestry & Environment	Medium	High	High	High	High	Key Players
Ministry of Mineral & Energy Resource	High	Low	High	High	High	Key Players
Ministry of Public Work	Low	Low	High	High	Low	Context Setter
PLN	High	High	Low	Medium	Medium	Key Players
Regional Government	High	Medium	Low	Low	Low	Key Players
NGO	High	Medium	Low	Medium	Low	Subject
Local community	Medium	Low	Low	Low	Low	Crowd

Ministry of Environment and Forest

As *Tampur I* hydropower is non-forestry project but located within the forestry areal, MOEF plays important roles in the context of the loan-use forest areal permit. MOEF itself consists of different divisions and sub-divisions within its management system. One division that has responsibility regarding the requests of loan-use permit is Directorate General of Planology and Environmental Governance. According to the expert interview, the main role of MOEF in *Tampur I* hydropower development in as reviewer of the technical permits for loan-use permit requested by *Kamirzu*. In terms of loan-use permit requirement, there are two processes that have to be fulfilled by *Kamirzu*, which are administrative permits and technical permits (Article 14 *Permen* No. 50/2012). Administrative permits consist of several legal documents, such as (1) sectoral permit which is in *Tampur I* hydropower project means Power Supply Business License and/or Power Plant permit, (2) *Kamirzu*'s company profile, (3) Governor recommendation letter, (4) deed of incorporation and change, (5) tax ID number, and (6) the latest audited financial report by public accountant, as well as (7) the statement in the form of notarial deed. Meanwhile, in terms of technical permits comprise several documents,

such as (1) set of environmental permit, Feasibility Study, EIA documents, (2) project planning and location map, (3) remote sensing imagery maps, (4) technical consideration from head of Directorate General of MEMR issued by the Governor, (5) statement letter from the head of candidate developer, and (6) technical consideration from President director of General Company of *Perhutani* (Indonesian Forest Company). The role of MOEF is merely limited to the approval of loan-use permit for *Kamirzu*. There is a shared authority in the context of monitoring and evaluation, which it is handed over to Forestry and Environmental Services office in provincial level of Aceh.

Ministry of Energy and Mineral Resources

In Indonesian government structure, MEMR is at the same level with MOEF as the representative of central government with different sector to focus on which is governing the energy and mineral resources development. It consists of several divisions with each different tasks and functions called Directorate General, such as new and renewable energy, energy conservation, oil and natural gas, mineral and coal, electrification, geological bodies, research and development, as well as human resource development (MEMR, 2018). MEMR has a high authority to issue national policy and regulations with regards to energy sector of Indonesia, for example set a national energy policy as a national guidance for all regional governments in terms of energy development and investment. In the context of new and renewable energy sector, there is one directorate that focus on the development, named Directorate General of New and Renewable Energy of Indonesia. It handles investment, collaboration, services, business supervision, including the development and implementation of new and renewable energy in Indonesia. MEMR handles strategic roles and authorities, in terms of setting a price for electricity supply including B2B project between IPP and PLN.

Compared to the role of MOEF in the development of *Tampur I* hydropower, MEMR has less direct roles and participation within it. There is less direct involvement in the pre-construction and construction phase of *Tampur I* hydropower. After IPP conducts FS and permit document from provincial government, subsequently MEMR used to proceed, assess, decide, monitor and evaluate the permit proposal requested by IPP. Since the new regulation approved by the ministry of MEMR, currently the bureaucracy process of IPP's or private's power plant project alters. According to PP No. 50/2017, for example, if all the permits have been clear, head of directorate will assign the IPP to develop a power plant in the location with a coordinate points. Then, the rest will be handed over to PLN. In the other words, IPP or private project

will be handled by PLN. The new role of MEMR is limited to monitoring and evaluation in the practice of *Tampur I* hydropower.

Ministry of Public Works and Public Housing

MOEF, MEMR, and MOPW fundamentally have the same authority to issue and set policy and regulations based on each of organizational interests. According to Minister regulation of MOPW No, 15/PRT/M/2015, MOPW is basically a central government institution focuses on public works and public housing, including in the sector of water resource management, construction services, and public infrastructure development. Dam building for electricity supplies is categorized as public infrastructure to build by the government and under the interest of MOPW. One subdivision in MOPW named water resources utilization cooperation handles the construction of any water resource utilization project collaborations, including dams as energy supplier. Another authority of MOPW that is also as the same as MOEF and MEMR is to formulate policy and regulations of public works and housing, including dam building. That authority puts MOPW in the high powerful position in the governmental system.

In contrast, the direct involvement of MOPW in *Tampur I* hydropower is less than two above ministries. Since, *Tampur I* belongs to private authority and located in protected forest area, MOPW has no participation and involvement from pre-construction until the monitoring and evaluation process. Dam building in the first phase of hydropower construction is under the authority of *Kamirzu* as the project developer. Specifically, MOPW also has no a particular division or focus domain to govern and handle the development of new and renewable energy. Hence, every new and renewable project that belongs to private or IPP will be not under the authority of MOPW. In conclusion, the role of MOPW is limited to issuing the permit of water resources use with under the condition if the dams locate outside the protected forest area. In conclusion, MOPW does not have significant direct roles and focus of interest in the pre-construction of *Tampur I* hydropower although the degree of power is as high as MEMR and MOEF.

PLN

Among the stakeholders in the power sector, PLN, as a state-owned electricity power company, has a vital and significant role in the development of renewable energy power plant in Indonesia. As a buyer in the market of electricity supply, PLN controls the price and standard of services, also buy the electricity from the IPP under the long term purchase agreement. The

focus of interest and organizational role of PLN regarding *Tampur I* hydropower is higher compared to the other governmental institutions, since PLN has direct interaction and intense communication with *Kamirzu* as the IPP. In contrast, the degree of power in the context of regulation and legitimation is limited as the basic tariff and basic quality of services are regulated by the government, which is MEMR. PLN has no authority to issue a policy or regulation regarding the energy supply industry. The main role of PLN in terms of private power plant project like *Tampur I* hydropower is as a single buyer and connect directly with the developer and customers. Another role of PLN is to review and ensure the FS conducted by *Kamirzu* if it is feasible and proper to continue or not. In the context of human resources, PLN consists of several units focusing on different domains. These units cooperate with each other in developing a power plant for electricity supply. PLN has a special division of new and renewable energy which concerns on any renewable energy projects, including *Tampur I* hydropower. This division has authority to hold the selection mechanism to select a particular IPP to develop a power plant in certain area. Besides assigning the selected IPP, PLN is the institution who will sign the legal contract of power purchasing or PPA with IPP and do the review and monitor towards the feasibility study that has to be conducted by IPP in the pre-construction phase.

PLN is tasked to supply the electricity needs of the Indonesian people and expected to aim the national electricity supply target by MEMR, including 23 percent of renewable energy supply target through building renewable energy power plant in all areas of Indonesia. PLN used to be the monopoly buyer, but in order to achieve the 35.000 MW target by 2025, the government currently opens the opportunity and allows private sectors (IPP) to build the power plant and generate the electricity as the form of participation in increasing the national electricity supply business. At the same time, PLN still play interfering role from the initial process, the transmission, and still holding the monopoly on the distribution of electricity in Indonesia. IPPs are obliged to sell the electricity produced by their power plants to PLN. It also has to ensure that IPP obeys all the laws and regulations existing in Indonesia. In the sense of financial sources, PLN is dependent on the government subsidy to establish the electricity power plan. Since 2011, the government subsidy for PLN has been decreasing until 2015, but then it rose up again for approximately 6,43% in 2016 (Annual Report of PLN, 2016). That makes PLN has lesser influence in terms of budget allocation to develop new and renewable energy in Indonesia, although the main interest of PLN is to safeguard and rise the electricity

supply all over Indonesia. PLB lacks the sources and means to build sufficient number of power plants by itself in Indonesia.

Regional Government

Regional government in *Tampur I* hydropower development involves two different legal structure of level, which are government of *Acehnese* province and *Gayo Lues* regency. Regional governments put high interest and intensive attention on the development of *Tampur I* hydropower since it is located in their livelihood areal. In contrast, the authority belongs to regional governments to influence the development process of *Tampur I* hydropower is limited. Regional governmental bodies that are relevant to *Tampur I* hydropower are environmental and forestry service offices. The limited authority and role of these bodies is due to the location of *Tampur I* hydropower is in the protected forest area where it is covered by the domain of central government, in this case MOEF. Besides limited authority, regional governments have low level of legitimacy among the local people which might be influenced by the trust issue between the regional government and the people in *Lesten* village. Compared to the other provinces in Indonesia, *Acehnese* province has a difference in the context of issuing the regional regulations. Province of *Aceh* retains the control over their natural resources management and land use decisions. *Acehnese* government has their own regulations, including on how to manage the natural resources and forest management, but the coverage and influence are lesser than the national regulations. The legal strength of regional regulation is below the national one. That aspect influence the power level of regional government to make a decision upon the development of *Tampur I* hydropower.

Local NGO: *Harimau Pining* and *WALHI Aceh*

The term of community-based organization which is engaged with natural resources and environmental management widely spreads all over the world including Indonesia, in particular *Acehnese* province. There has been growing environmental grassroots movement in *Aceh*, since *Aceh* is located in special territorial status areas and rich of abundant of natural resources. NGO is positioned as the representative of local community to voice their thought and opinion regarding one particular issue. *Aceh* itself has a lot of NGOs or local organizations focusing on environment. In *Tampur I* hydropower, there are a lot of NGOs pay attention to this project, moreover it takes out some part of forest areal in their province. *Harimau Pining* and *WALHI* are ones of the local environmental NGOs who has been concerning and following the recent updates of *Tampur I* hydropower development. Compared to other legal governmental

institutions, NGOs do not have a legal authority to issue any regulations and permits regarding *Tampur I* hydropower development. In contrast, NGOs are able to be legitimate to influence the local community perceptions towards this project. The interactions formed between NGOs and local community occur more frequent In particular *Harimau Pining* which locates in *Pining* village nearby *Lesten* village. The role of *Harimau Pining* and WALHI is fundamental, in case of in the middle of negative tensions in the society due to this project. They play role as a bridge between the local community and government either national and regional to deliver perceptions and opinions of local people. The engagement between NGOs and local community in social and environment issues are naturally formed following their daily activities. The isolated location of *Lesten* village becomes a shortcoming for local community to be updated regarding the progress of *Tampur I* hydropower development. Through the participation and involvement of these NGOs, they supervise the project, starting from the pre-survey until monitoring and evaluation steps. Their existences are unofficially recognized by the local community and regional government in *Aceh*. As an example of NGOs participation is inviting them to the pre-survey activity of relocation area for *Lesten* people. That increases the level of legitimacy of NGOs in the eyes of local community. They put their interests and concerns, not only environment, but also how to protect the local people with their indigenous historical values and cultures.

Local community

The level of local community involvement in natural resource management varies in the different regions (Reed et al., 2009). In the case of *Tampur I* hydropower, the participation level of local community is not significantly influencing. The location of *Tampur I* hydropower construction hits their residential areas within the forests where become the source of livelihood since long time ago. A home where local communities has been planting traditional and historical values within it. People of *Lesten* are not intensely involved in the pre-construction phase of *Tampur I* hydropower. Lacking of information with regards to *Tampur I* hydropower development, local community has no significant role since the beginning of pre-survey activities. Head of *Lesten* village or in traditional name called *Pengulu*, is limited to merely be a facilitator and bridge between local people and *Kamirzu*, since most of them speak in traditional language which people from company could not understand. During the process, local community merely follow the instructions from the regional governments, including the relocation area planning, economic incentives and compensation from *Kamirzu* due to the

puddle area nearby their houses. At the end, local community do not have strong legitimacy to negotiate and have a dealing with *Kamirzu*.

4.2 Influence-interest mapping matrix

Stakeholder analysis and social mapping aims to identify the actors, groups, communities, organizations of ways to act based on their interests within the stakeholders setting and networking related to specific issue (Rockloff and Lockie, 2006). Through stakeholders mapping, it aims as a framework in doing policy analysis which reflects the roles and relative powers of key players, potential support and oppositions and highlights the relevancy of positions and legitimacy of each stakeholders with relevant policies and regulations from different sectors. Stakeholders analysis mapping aims to identify if the policy goals and instruments are in line with the implementation with *Tampur I* as a case study. Also, it helps to perceive on how relative power and interest of each stakeholders influence the their perspectives towards the relevant policies with *Tampur I* hydropower development. Within stakeholder analysis, this research aims to identified to what extent involved stakeholders in *Tampur I* hydropower play their roles based on their level of power and interest. Stakeholder analysis aims to collect the information, including their actions, interest, and degree of power of relevant stakeholders involved in *Tampur I* hydropower development.

Through stakeholder analysis, it aims to identify the established coalitions or relationships among all involved stakeholders, in particular conflicts during the pre-construction phase of *Tampur I* hydropower. Stakeholder analysis helps to situate the actor positions, governance structures and interactions in the context of social and political aspect as every actors or individuals or organizations are affected by the decision made (Evans, 2009). In the context of policy science, stakeholder analysis is perceived as a mean to conduct policy analysis and to analyse the distribution of power and the role of interests of policy actors and the impact of their interrelations among the stakeholders on the policy (Brugha and Varvasovszky, 2000).

Power

The central governmental bodies, such as MOEF, MEMR, MOPW, including PLN have higher influence on the development of *Tampur I* hydropower compared to the regional governments and other non-governmental institutions. Their high positions in government structural and power lead them to have high decisive influence on the decision-making until the implementation processes. These stakeholders are the most important and influential actors, as

they have legal and official authority to establish, issue, and reform the policies and regulations in the national level that are relevant to *Tampur I* hydropower development. These central governments involved in both policy formulation and policy implementation. Besides playing role in policy formulation, the thing that make these organizations' positions vital is because of the issuing permits in the pre-construction phases of *Tampur I* hydropower. Each of ministries has a legal permit that has to be fulfilled by *Kamirzu* and that permit is merely approved by the Ministry of the relevant institution in the national level. Some changes of regulations and policies will influence the process development to the regional level as well. PLN is different with the other central governmental positions in the context of power degree. As the central level of state body, PLN is involved directly and significantly in the development process of *Tampur I* hydropower. PLN is the one which signs the agreement of power purchasing and have a direct purchasing process with IPP. If specifically speaking in terms of regulations, PLN is not involved in policy formulation as same as the central ministries, such as MOEF, MEMR and MOPW, which is limited to aim level of policy implementation. For instance, the national energy target of 23 percent in achieving renewable energy transition that is carried out by MEMR, PLN only plays the role as the developer, supplier, and buyer of electricity power plant. Co-operating and collaborating with private sectors in the energy sector are also the role of PLN in the level of implementation. Targets, regulations and policies formulation are not under the authority of PLN. In this case, PLN, under the division of renewable energy resources, has lower degree of power in the development of *Tampur I* hydropower. Compared to MOPW, in the level of influence, PLN brings more influence on the development of *Tampur I* hydropower than MOPW since it is the body who assign and choose the selected IPP or investor that is feasibly to run and establish the hydropower project. In this case, *Kamirzu*'s position depends on the assessment and review results of PLN in the initial development process before the construction of *Tampur I* hydropower starts. Ferrary (2009) in his research mentioned some examples showing that a stakeholder with no legal power is able to have an indirect influential action to the other stakeholders' actions or decisions.

In terms of degree of power, regent government, NGO, and local community have less significant influence on the development of *Tampur I* hydropower. These groups of stakeholders may not know the real goals or objectives of the *Tampur I* hydropower project, in particular the local community with lack of education level and knowledge. That might lead to the rejection of some local communities and NGOs against the development of *Tampur I*. These rejections will not significantly influence the implementation, as *Tampur I* hydropower project

has been listed as one of the additional national program to accelerate the 23 percent target of renewable energy development in Indonesia legally. That means *Tampur I* hydropower has strong legal support from the central government in the pre-construction process. These stakeholders merely involve in the policy implementation as the passive players or actors in the development of *Tampur I* hydropower. Passive actors here means that there regulations wait for the instructions from the central government to do. They do not have direct influence on the decision-making processes regarding *Tampur I* hydropower. As well as, they do not support any financial sources to this project which *Tampur I* hydropower belongs to private project. Hence, these stakeholders above have low influence on the building process. Compared to central government bodies, these have high influences on the realisation of *Tampur I* hydropower process. If the requested permits are not subsequently approved by these ministries, the project development will be hampered.

Interest

As there are multi-sectoral stakeholders, there are as well many stakes of interests in the development of *Tampur I* hydropower. The stake of renewable energy transition of development that is the most relevant to development of *Tampur I* hydropower belongs to MEMR domain. Including the MOEF which also puts renewable energy development as non-forestry activities to be built in forestry areal. In the case of *Tampur I* hydropower development, one fact found interesting with regards the relationship gap between the level of interest and the roles of actors. In the pre-construction process of *Tampur I* hydropower, MEMR has less significant roles with this project development, as *Tampur I* hydropower belongs to private project. That means, the financial sources, administrative and technical permits are under the responsibility and obligation of *Kamirzu* to request. The main interest of MOEF in general is forest preservation and management, however in *Tampur I*, its role is more active and intense than MEMR with higher interest. The strength of the interest of MEMR is still strong because if *Tampur I* hydropower is delayed or disturbed in the development process, the MEMR national 23 percent target of renewable energy transition and development will be threatened. That might influence the institutional target and at the end appear as if the less positive performance image.

MOPW also has the least interest level in *Tampur I* hydropower development. This is due to the main stake of MOPW is focus on the public housing and infrastructures building. Hydropower, such as *Tampur I* hydropower, is included as infrastructure built for the sake of public, but the role of MOPW is only limited to give the dam permit in the pre-constructions

and not involved in the rest of realisation process. This is because the status of *Tampur I* hydropower is under the name of private investor, *Kamirzu*. This means, the pre- and construction of water dams for the *Tampur I* hydropower is not covered by the concern of MOPW. In contrast with PLN, it is highly interested in *Tampur I* development in which is in line with the vision and missions of PLN to increase the electricity supply to all over Indonesia through governmental, private and either private partnership electricity power plant projects. If the development of *Tampur I* hydropower is not realized, PLN will may face the disadvantages in terms of time allocation, human resources, and budget. Besides losing of physic sources, that will influence the other power plants development targets of PLN to improve the electrification ration in Indonesia through renewable energy transition and development.

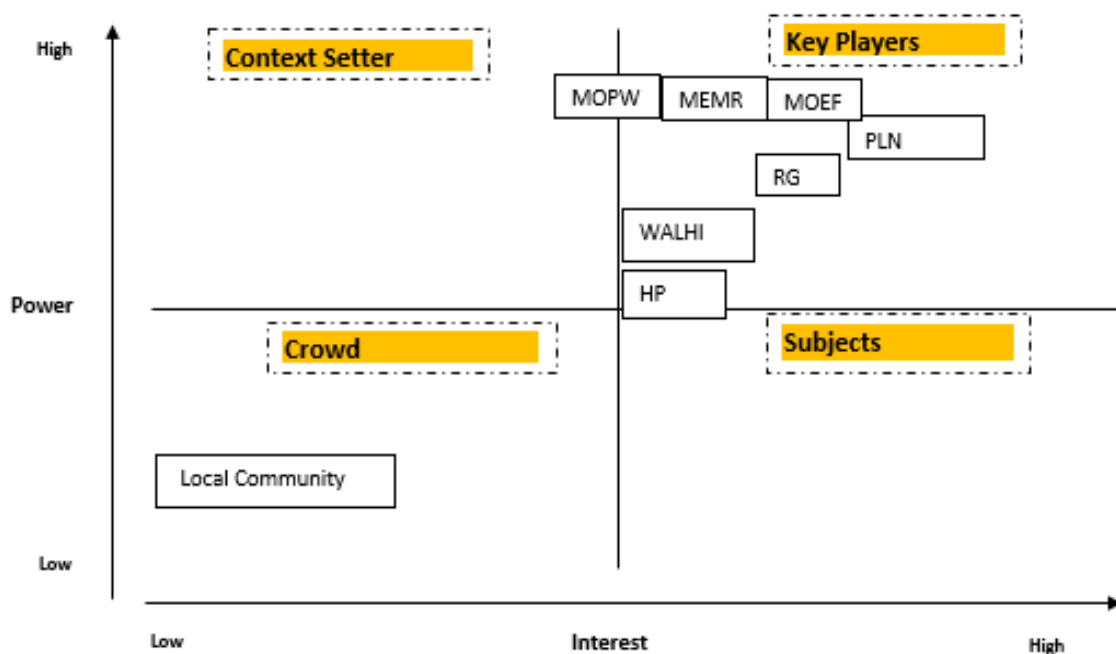


Figure 10. Power Interest Matrix of *Tampur I* hydropower

According to Mitchell et al. (1997), power-interest grids matrix can be an approach in order to identify the positions of involved stakeholders by categorizing into four groups, which are players, subjects, crowd, and context setters. In the case of *Tampur I* hydropower, through these two-by-two stakeholders matrix based on the level of influence and interest, the first group is PLN is considered as the most important and key player in the development process. As seen from the Figure 10, PLN has both an interest and influential power to the development of *Tampur I* hydropower. In contrary with the other central governmental institutions, such as MOEF, MEMR, and MOPW are in the second group of stakeholders as the context setter. Context setter represents group of stakeholders that are potentially play essential and influential

roles in the project if they put more interest on it. They are having more powerful positions and authorities but lower interests degree on the progress of *Tampur I* hydropower development. These ministries are merely handling the legal permit documents on each of the domain. As after the permit from their institutions are completely approved, the rest of the development process are not under the responsibility of them. Regent government is positioned in the third group named Subject, together with local NGOs, such as *Harimau Pining* and *WALHI Aceh*. This category represents group of stakeholders who are highly interested in *Tampur I* hydropower but powerless and lack of authority to govern and influence the decision-making and implementation process. The last group category is crowd. This belongs to stakeholder or actor who are lack of interest and influence, as this stakeholder do not have decisive direct roles in to influence the success of project. Local community in *Lesten* village is placed in this category. Their interest is to have a prosper and safe livelihood, as long as any project would not violate their nature of interests, improve the better quality of life, and not create any economic losses, local community may support *Tampur I* hydropower.

4.3 Roles and interest of stakeholders in *Tampur I* hydropower development

Stakeholders analysis mapping matrix showed stakeholder who is expected to be relevant to and playing important roles on renewable energy development like *Tampur I* hydropower practically possess weak interest on the development process of *Tampur I* hydropower. For example, MEMR, as the governmental institution who primarily focuses on energy development sector in Indonesia, which generally promotes and supports the renewable energy development project, but has limited roles in terms of private project like *Tampur I* hydropower. The development of *Tampur I* hydropower becomes strategic national energy target and program issued by MEMR in order to push sustainable and renewable energy, also to improve the economic development by increasing the electrification ratio in Indonesia. The limited role to private renewable energy power plant project like *Tampur I* hydropower limits the access of MEMR to monitor and evaluate the whole project development process. This explains that *Tampur I* hydropower is not the priority project of MEMR, even though listed as one of national renewable energy project expansion in Indonesia. This way shows that high level of power of a specific stakeholder is not aligned with the level of interest of a stakeholder to a particular project. An actor is categorized as legitimate and powerful stakeholder in the context of policy and decision-making, yet in the context of implementation, MEMR is more likely limited to interfere the development process of *Tampur I* hydropower. The lack of their interest may bring harmful impacts on the project, because the installation of *Tampur I*

hydropower project involves different sectors and impacts local community and natural resources in Aceh. Also, since *Tampur I* hydropower is private project which needs to monitor and evaluate for preventing negative externalities.

There are also a key stakeholders for whom energy is not the main interest, but ones still involved in *Tampur I* hydropower development process. For example, the stake of Ministry of Forestry focusing on the utilization of forest areal for non-forestry interest activities support *Tampur I* hydropower as long as following loan-use permit condition and regulation. Yet, this permit can proceed if the other permits from PLN, Ministry of Environment and regional government have also approved. As a result, if the stake of other key stakeholders are not aligned, the loan-use permit is postponed which delays the subsequent permits and processes, such as permit issued by MOPW. At the end, the uncertain and unexpected permit processes fails *Kamirzu* as the developer to complete the development processes of *Tampur I* hydropower.

My interviews show that the grass root organizations, including *Harimau Pining* is divided into two positions, which half of them support *Tampur I* hydropower and the rest of them oppose. The interview indicates the leader of *Harimau Pining* supports the *Tampur I* hydropower development process, yet the vice leader opposes the implementation process. Those who oppose assuming there will be negative effects on their stakes from the development process of *Tampur I* hydropower. As a result, groups of local environmental NGO took an advocacy way and negotiation to MEMR which influences MEMR in issuing loan-use permit as a consideration of the urgency and benefit of *Tampur I* hydropower development. Local community's position depends on the number of incentives and compensation provided by *Kamirzu*. As they live very close to the area of *Tampur I* hydropower building, they are the most influenced stakeholders due to this *Tampur I* hydropower development project. This is because once *Tampur I* hydropower project is completely finished, local people in *Lesten* will be relocated to new residential area (LC1, 2018; RG3, 2018) Therefore they can either support or oppose according to the benefit and losses they will get from the unexpected changes (HP1, 2018). Regional governments in this case possess high interest on the development process of *Tampur I* hydropower, as it is located in their authority domain area. As *Tampur I* hydropower is legally listed in national energy development target 2017 and 2018 by MEMR as central government representative, regional governments are mandated to promote and support the *Tampur I* hydropower project in the level of regional government. For example, aiming at giving seminar and informing the local community to minimize the social conflict in the site.

Last but not least, PLN, as the only institution who has direct legal power purchasing agreement with *Kamirzu*, puts high interest on the development process of *Tampur I* hydropower. PLN has priority to develop and diffuse renewable energy power plant by exploring the local potential natural resources in every regions in Indonesia like *Tampur I* hydropower in Aceh. Since *Tampur I* hydropower project is mandated officially by MEMR and the role of PLN, as the extended hand of MEMR, is to keep the whole processes on the track from the beginning. PLN is mandated to have direct control and monitor to private renewable energy power plant project like *Tampur I* hydropower, therefore they support.

In conclusion, I found that key stakeholders take large involvement in the development of *Tampur I* hydropower development with strategic roles and large coverage. However, some potential key stakeholders possess weaker interest on *Tampur I* hydropower development in practice or in the field. Also, key stakeholders merely play their roles of their institutions in the context of decision and policy-making which results in indirect involvement and communication with *Kamirzu* as IPP in the realisation of *Tampur I* hydropower. For example, the roles of key stakeholders in the central government are merely limited as policy and regulation maker. Yet, the institutional role as policy and decision maker makes the governmental stakeholders are assessed as key stakeholders in the development of *Tampur I* hydropower. It also can be concluded key stakeholders which are central governmental institutions or ministries tend to support the *Tampur I* hydropower development in order to develop and achieve the national energy target as part of their roles and responsibility in the institutions to support governmental program. Here, the relations between the roles of the potential key stakeholders are expected to play important roles in realisation of *Tampur I* hydropower development and rely on each other. Yet, it can be said that the relations are not obviously integrated and aligned in the development process of *Tampur I* hydropower based on the interview and results which results in the delay of required permit in the realisation of *Tampur I* hydropower project.

4.4 Power, interest and position of stakeholders in *Tampur I* hydropower

In section 4.3, the stakeholders' power and influence have been described according to their capacity to issue regulations, legitimacy, resources and information they can provide with regards to the development of *Tampur I* hydropower. Key stakeholders of *Tampur I* hydropower development have been depicted with high level of power and significant influence to the development process of *Tampur I* hydropower development. In this section, the level of power

and position of involved stakeholders are analysed and discussed to identify the impacts of the stakeholders on the realisation of *Tampur I* hydropower project.

The involvement of large number of key stakeholders may bring two effects on the implementation process, such as making the system more complex to manage (Loorbach, 2007) and risk for opposition group of stakeholder (Isakhanyan, 2010). As mentioned previously that *Tampur I* hydropower development process mostly and dominantly involve key stakeholders who are central governmental institutions. For instance, the delay of bureaucracy permit for *Tampur I* hydropower by environmental ministry creates the delay of loan-use permit by forestry ministry to allow *Kamirzu* starting the construction of project and request for the other required permits from other ministries. Meanwhile, the influential stakeholders mostly oppose the *Tampur I* hydropower project as the assumed negative impacts due to the development of *Tampur I* hydropower. The opposing group of stakeholders are mostly from local environmental organizations, such as *Harimau Pining* and *WALHI ACEH*, created an investigation of the benefit and feasible losses to criticize *Tampur I* hydropower. Yet, the effort to win the opposing group of interest is hampered with the existence of more legitimate and powerful group of stakeholders supporting the project which come from central governmental institutions. The level of power and position of stakeholders eventually give impacts on the realisation of *Tampur I* hydropower development. The involved stakeholders are mapped in the power-interest-position matrix.

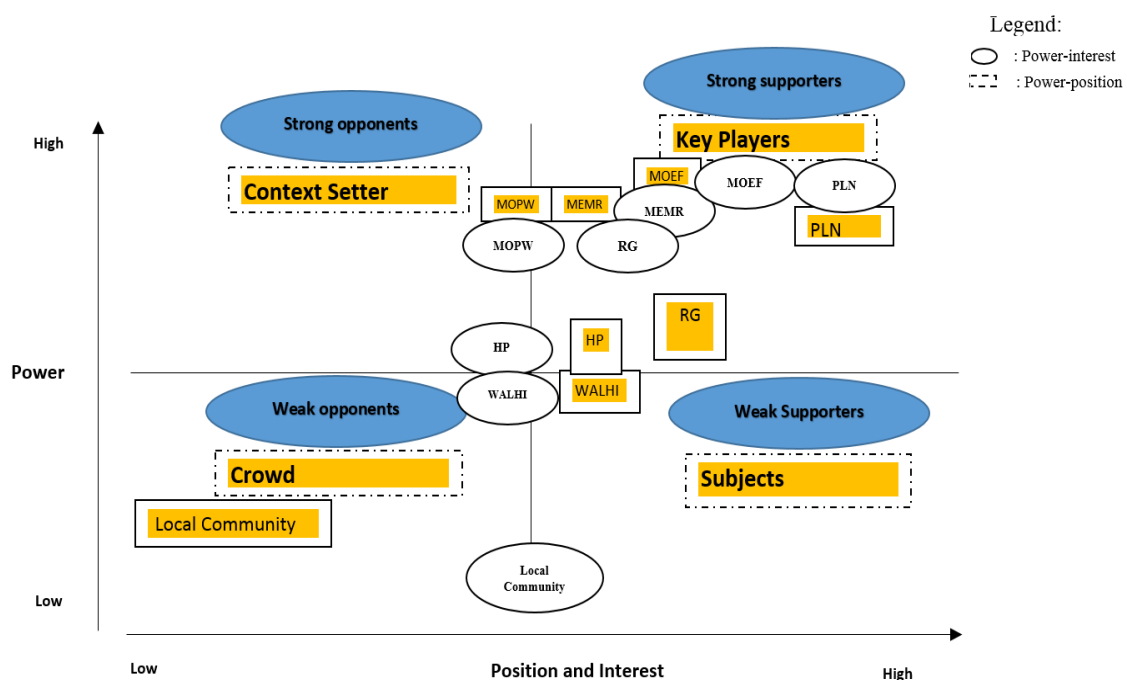


Figure 11. Merged Power, Interest, and Position Matrix of Stakeholders in *Tampur I* hydropower

According to the stakeholders' power-interest mapping matrix, the involved stakeholders are mostly positioned as key players. Figure 11 shows the relations between level of power, interest, and position of stakeholders to the realisation of *Tampur I* hydropower development process. The Figure depicts that the key stakeholders are divided into two group of positions, first those who support and those who do not support *Tampur I* hydropower project. As we can see in the figure, the more powerful and legitimate stakeholders come from governmental institutions which strongly support the development of *Tampur I* hydropower project. MEMR, MOEF, MOPW, and PLN are the key stakeholders. They are not the project initiators, but they help designing and developing the realisation of *Tampur I* hydropower project especially in terms of setting the agreement, making decisions and permit regulations to *Kamirzu* as the IPP. They consist of different sectors, however their positions, as part of central government, mandate them to support the national energy development target. This also means to support *Tampur I* hydropower development as mandated in national energy plan.

Another indicated key stakeholders in *Tampur I* hydropower development are local environmental organizations, such as *WALHI* and *Harimau Pining*. They are considered as key stakeholders as they put high interest on the development process and progress of *Tampur I* hydropower. Yet, they have low level of power to influence other stakeholders and the development process of *Tampur I* hydropower. Their positions towards *Tampur I* hydropower are in the middle of supporting and opposing *Tampur I* hydropower project as *Tampur I* hydropower development project violates the values or environmental protection.

Here, the relation between the level of power, interest, interest of involved stakeholders drives to finding the stakeholders' impact on the *Tampur I* hydropower development and implementation processes. *Tampur I* hydropower is private project under *Kamirzu* as the project initiator and developer. *Most* of the involved key stakeholders support the project which results *Tampur I* hydropower can be mandated in one of the program to achieve national target and start the implementation process in the field. Lower powerful stakeholders which are not fully considered as key stakeholders, such as local environmental NGOs and local community play insignificant roles in making changes or conducting advocacy process to *Kamirzu* and governments. These powerless stakeholders are driven by the personal stake or interest. For example, local environmental NGO fulfil their vision and mission to protect the environment in their region, meanwhile local stakeholders can presumably support or oppose *Tampur I*

hydropower depending on what benefits they can receive and what compensation can cover the losses.

Summarizing the analysis, the stakeholders in the key players group do not always possess a strong support to a project. For example, if *Harimau Pining* is in favour and provides support, but its support poorly to the development of *Tampur I* hydropower since the lower level of power they have in order to make a change or adjustment. That means, the position of one environmental organization, like *Harimau Pining*, can influence the other stakeholders to join the other local NGOs and local communities to oppose *Tampur I* hydropower, as *Harimau Pining* is considered as the oldest local environmental NGO in the region. There are still many local environmental NGOs who oppose *Tampur I* hydropower and create coalition to oppose, however they are not involved in the research. Despite many voices of local environmental organization coalition to oppose *Tampur I* hydropower project, but the effort cannot significantly influence the realisation of *Tampur I* hydropower. That is because main key stakeholders have approved this project to start. Also, local environmental NGOs and community have lower level and legitimacy to change on going national project.

In conclusion, this section highlights two aspects, they are: (1) the relation between the key stakeholders' position and the implementation process of *Tampur I* hydropower development. Despite the fact that *Tampur I* hydropower is a renewable energy investment project that is initiated, developed, and handled by foreign private company, the development process cannot start without the role and support of key stakeholders. Most of them are governmental organizations, either central or regional, to set target, project, and issue policy regulations to govern the renewable energy power plant development in Indonesia. This means every strategy, action, changes or adjustment, and regulation issued by key stakeholders either to support or block *Tampur I* hydropower development process can influence the other involved stakeholders, in particular in the group stakeholder of crowd and subjects with low level of power. It can be concluded that if one primary key stakeholder blocks or delays the development process of *Tampur I* hydropower, the project implementation can be delayed. Second finding of this research is (2) the importance of local environmental organizations or grass root movements in bringing the influence to the development of renewable energy innovation and transition in Indonesia. The existence of the local organizations either can bring either strong or weak support and rejection to the development process of *Tampur I* hydropower. The strong or weak position of local organization depends on the power and legitimacy they construct in local community and government. Also, the willingness of governmental bodies to create more

participatory setting and increase local capacity in renewable energy development projects in the rural areas. The next chapter is subsequent analysis stage of this thesis research which analyse policies from several sectors that influence *Tampur I* hydropower implementation process and identify the coherence or incoherence area of each policy domain.

5. Policy coherence influencing *Tampur I* hydropower

In the previous chapter (see Chapter 4), the participation of stakeholders has been mapped to understand the different roles, the involvement level of stakeholders from different changes occurring over the time. This chapter discusses the identification of coherence degree of several sectoral policies that influence the implementation of *Tampur I* hydropower. This chapter shows in what forms the policies are coherent or incoherent to either support or hamper.

The extent of policy goals is considered as a coherent policy if logically the policy goals and objectives meet along without any major contradictions and trade-offs (Kern and Howlett, 2009). This chapter points out the discussion on the second research question with regards to the degree of policy coherence that influences the development process of *Tampur I* hydropower from the perspectives of the actors. This chapter focuses on identifying the relevant policies and analysing if they are coherent with each other and their influence on the success of *Tampur I* hydropower from the perspectives of involved stakeholders from the different level of legal positions in terms of their roles, power, and interests to the issue. The coherence of different policy domains is assessed by identifying the interest and influence of involved stakeholders in affecting it. As well as presenting the findings in the field of how stakeholders perceive the policy coherence within three systems in the case of *Tampur I* hydropower and how the relationship between policy goals, instruments, and implementation creates a coherence to support the development of *Tampur I* hydropower from internal, temporal, and external policy perspectives. The multi-sectoral policy is shown that one policy theme contains several policy instruments with different focus of objects. Policy instruments are the means of government to achieve the policy goals (Cejudo and Michel, 2017).

Tampur I hydropower takes place in the context of institutional uncertainty which means as during the process, decision-making takes place in different arenas from national to the local level with various policies involve (Cejudo and Michel, 2017). Weible (2006) mentioned that stakeholder analysis is at first necessarily functioned as policy analysis to help to provide a guide to identify stakeholder's perception toward the influencing policy and the magnitude of change in a policy subsystem. As well as, in the previous chapter, stakeholder analysis has identified and mapped out the involved actors or institutions based on their relative level of power, influence, and interest with regard to their identified roles in the development of *Tampur I* hydropower. There it aims to identify the potential coalitions of support and opposing *Tampur I* hydropower development project.

Tampur I hydropower project, in which institution has the highest interests and decisive influence to the success of *Tampur I* hydropower construction, in which stakeholders oppose this project by social conflict and information gap that occur in the process. For example, debates on the urgency of building *Tampur I* hydropower and the agenda that regional government should prioritize. As *Tampur I* hydropower development involves multiple roles of actors from the different level of society, national, regional, and local, it also involves the combination of different elements of policy including policy goals, instruments, and implementation. Stakeholder analysis shows to what extent and which stakeholder has the power to influence the process in regards to authority, position, and legitimacy to issue and reform the relevant policies from diverse domains or sectors. These policy arenas that influence *Tampur I* hydropower development process consist of five domains, they are (1) forest management, (2) water management, (3) environmental permit, (4) energy production, and (5) role of regional government. These are relevant to *Tampur I* hydropower since they share a set of relevant objectives regarding renewable energy development process in Indonesia.

Table 4 summarizes the lists of policy that are relevant to *Tampur I* hydropower, including the policies domains, established stakeholders alliances, actions and strategies, in order to build legitimacy and policy-making process (Aligica, 2006).

Table 4. Current policies and regulations influencing Tampur I hydropower development

Policy Domains	Policy Instruments			
Forestry	Utilization of forest area (PP No. 105/2015)	Guidance for Loan-use Forest Area (P.50/Menlhk/Setjen/Kum.1/6/2016)	Forestry (UU No. 41/1999)	
Water	Enterprising of water resources (PP No. 12/2015)			
Environment	Environmental Permits (PP No. 27/2012)	Protection and Management of Environment (UU No. 32/2009)		
Energy	Electricity Supply Business Plan RUPTL 2017 (ESDM Ministerial Decree No. 1415K/20/MEM/2017)	General National Energy Plan (PP No. 22/2017)	Principal in Power Purchase Agreement (ESDM Ministerial Regulation No. 49/2017)	Use of Renewable Energy Resources for Electrical Providing (RDM Ministerial Regulation No. 50/2017)

Kern and Howlett (2009) stated that in order to support a policy goal, the policy instruments have to be consistent and not work against each other. This means all policy instruments relevant to *Tampur I* hydropower have to be consistent and coherent in efforts to achieve the completion of *Tampur I* hydropower development process as one of national energy target program in increasing ratio electrification. In terms of instruments, energy sector, under MEMR, is the most influential policy arena to the development of *Tampur I* hydropower.

According to stakeholder analysis, central governmental bodies or ministries have the legal authority to make policy in regards to their main institutional domain. In this case, MEMR is the institution which puts the high interest regarding the new and renewable energy transition and development in Indonesia. It is also shown in the table above that MEMR issues four regulations and laws concerning on energy sector that influence *Tampur I* hydropower development. May et al. (2006) stated that the definition of policy coherence could be different and conceptualized in different ways, which makes it elusive and difficult to measure. This paper adopts the framework used by Huttunen et al. (2014) on how to assess the coherence of policy domains with three indicators that describe the interrelations between and within the policy domain, which are internal, temporal, and external (See Table 5). These components of policy coherence analysis are analysed using stakeholders perspectives in *Tampur I* hydropower development, related to the policy process and implementation, such as the distinguished roles between central and regional government, and how the policy instruments and implementation are in line in the field.

This chapter presents each section below to identify the policy coherence in selected relevant policy domains influencing *Tampur I* hydropower. To see the coherence level of the interplay of overall policy domains influencing *Tampur I* hydropower, the identification of policy coherence issues was conducted from the perspectives of internal, temporal, and external policies.

5.1 Forest management

Several policies from different domains influence, either contribute to or hinder to the interest of *Tampur I* hydropower development process. Forestry is one of an important sector that influence the implementation of *Tampur I* hydropower development, in particular, pre-survey phases. This is because of the location where *Tampur I* hydropower will be constructed which hits three different areas of forests (protected, production, and other land uses). Policies and regulations in forestry sector influence the ‘‘front door’’ of *Tampur I* hydropower in order

to ensure if it is feasible and eligible to build hydropower or not within the forest area, which will influence *Kamirzu*'s investment. In Indonesia, the forest area utilization for public infrastructures buildings, in which are considered as non-forestry activities development, including (1) power plant installation, (2) transmission, (3) electricity distribution, and (4) new and renewable energy development besides geothermal within the protected and production forests with inevitable strategic purposes, are permitted by Law number 4 of 1999 (UU No. 4/1999) about forestry and specifically governed by Government Regulation (PP No. 105.2015) with regards to utilization of forest areas. This permission is with under one condition which is called loan-use permit mechanism. The guidance of this permit is legislated in more detail by P.50/Menlhk/Setjen/Kum/1/6/2016 set by the Minister of Forestry and Environment, including setting the monitoring and evaluation process. In the case of *Tampur I* hydropower, *Kamirzu* as the IPP or project developer, has to get the approval of loan-use permit in order to be able to start the construction process.

In general, policy goals and instruments of forestry above push the *Tampur I* hydropower installation for increasing the electricity supply. The loan-use guidance (P.50/Menlhk/Setjen/Kum/1/6/2016) implementation may not particularly consider the social externalities, such as compensation and/or the economic incentives for the local community living in and around the forest area who get affected. Wild animals protection also may not elaborated in the instruments due to the private hydropower project. This unclear mechanism of how the externalities are regulated can result in the irresponsible forest use management and threatening the forest ecosystem in the new and renewable energy development in Indonesia. For example, four key species of national and world in *Tampur I* hydropower location are not planned and organised environmentally friendly in the pre-construction phase, to whom this responsibility is given to and taken.

Another discouraging point is the mismatch between the policy goals and implementations of forest management for supplying the electricity to people in rural forest areal. On the other hand, the purpose of hydropower building for society is not to reach properly and optimally. On behalf of the regional government, the Head of *Gayo Lues* regency forms a special team to estimate the amount of compensation for local people who are affected by this project. They estimate the compensation amount for lands, plants, houses, and other facilities. This mechanism is not clearly regulated in the policy instruments. This results in the ineffective policy goal to fulfil the livelihood needs of society.

5.2 Water management

Referring to historical stories of dam failures, the safety issue of dam becomes one of the critical factors to public acceptance of hydropower facilities development (Schellenberg et al., 2017). In terms of water management, the issue of dam safety is mainly relevant to *Tampur I* hydropower. As this project belongs to the private investor, it is necessary for the government to supervise and ensure the safety of dam construction before the hydropower operationalized. The safety aspects of the dam are pushed and assured in the relevant policy goal and regulation of water management domain. According to the expert interview also, dam safety is one of the main priority and an important aspect to achieve the goal in minimizing the social and environmental impacts, not limited to hydropower facilities but also for the other forms of purposes. Highlighted in the Ministerial Regulation (*Permen PUPR* No. 27/2015) regarding the dam mentions that the policy goal is to build the dam which is technically in line with the development goals and guaranteed in terms of safety of dams and regulations.

In general, the policy goal is encouraging the hydropower development and other water uses management. For example in Article 4 (2) mentions that dam functions as the raw water supplier, water irrigation, and/or hydropower. In the upcoming articles, there are no particular articles to govern the water sources use for energy power plan (hydropower) installation by private sectors. The interviewed expert mentioned as well that private hydropower is not under the authority of the central government to ensure the safety aspect of dam construction. This results in policy incoherent between policy goals and instruments. As same as the forestry sector, MOPW also requires water resource use permit documents to build a dam for any purposes. Here the interviewed expert stated that the role of government is limited to issuing the water source permit for hydropower building. The permit is for ensuring and supervising the dam construction although it is installed by IPP. The rest of monitoring and management of dam construction for hydropower installed by private investors is not regulated in national regulation of dam (*Permen PUPR* No 27/2015). The regulation mentions that dam management becomes the responsibility of the dam owner, which in the case of *Tampur I* hydropower belongs to *Kamirzu* as IPP. On the other hand, the total cost of dam management is determined by minister, governor, or head of regency with their authority and guided to legislation. Non-forestry allocation, such as hydropower building in forest areal, is regulated, but not specifically in the policy instrument of the water management sector. The step implementation is conducted back according to regulations in forestry sector. The regulation related hydropower project either by IPP and PLN may not significantly considered in the policy goal and instrument of

the water management sector in detail. For example, to what extent, from and to whom the monitoring and supervision conducted to the dam construction for private hydropower installation.

In terms of policy coherence, policy instrument regulates the resettlement of dam building for pre and during construction, for example, economic compensation with money and/or land replacement, including the relocation of community and transfer of protected wild fauna from the puddle area. Those particular articles in the regulation target the coherence between water sources use and forestry sectors, or between MOPW and MOEF officials. Another examples of coherence are proven in the article 7 (2) and interviewed expert that every single non-forestry activity in forest areal (protected forests) is regulated under the permit issued by MOEF.

The purpose of dam regulation is to guarantee the safety of dam construction to prevent or avoid feasibility of failures for any other purposes, including hydropower plant installation for electricity supply and to manage the dam building including the exploitation and maintenance. Despite in general the policy goal and instrument of water management sector is encouraging in terms of regulations, the implementation of legislation seems to fail in reassuring the safety of dam construction by the private sector. As it is not regulated clearly in regards to the private dam constructions from the preparation until the monitoring and evaluation step. Lack of coordination could hamper the community living in and around the dam construction since the government is limited to issuing water resource use permit in the initial process.

5.3 Environmental protection and permit

Every form of electricity power plant is built based on technical and economic feasibility from the central and environmental impact analysis study, including large hydropower (Lubis, 2007). This Environmental Impact Assessment is basically purposed to study the effects of such a proposed project or plan on the environment (Ogola, 2007). *Tampur I* hydropower is considered as large-scale energy infrastructure development with high-voltage transmission lines network and located within the critical areas for local people and wildlife (Hanafiah, 2017). The importance of having environmental impact studies in *Tampur I* hydropower project is to analyse the potentially affected environment and identify the mitigation measures. Here the environmental protection and permit play important role in the development of *Tampur I* hydropower. Environmental protection and management have been

on the Indonesian government's agenda through several policy instruments in different levels, such as Law number 32 of 2009 and government regulation (PP No. 27/2012). Besides environmental protection, both goals are to support the national development activities through natural resources management and utilization in harmonious and balanced ways. Internally, the general positive policy goals and regulations of environmental sector promote and support the hydropower development in Indonesia in general. Those policy instruments clearly set a mechanism of the environmental permit for any activities on the environment, including hydroelectric power plant like *Tampur I* hydropower project. Every business or activity is obliged to have EIA document as environmental permit process, either governmental and private.

As *Tampur I* hydropower is estimated to flood 4.000 hectares of the total area and make dozens of people to be relocated, the externality cost due to this project has to be estimated. However, there is no particular aim or instrument that governs the negative externality cost (e.g. compensation and incentive) to society due to private or IPP's hydropower building in a particular area. Criticizing the role of provincial government to provide coaching and technical assistance to the regency government and the society participation in the EIA process are regulated in the policy instrument. However, those are not validated in the field, for examples expert interviewees in the regency level had no idea regarding the assessment process of environmental permit and feasibility study of *Tampur I* hydropower because the policy instruments are not in line with the implementation. Also, less participation of local actors in the field in terms of environmental permit document issued by central and/or provincial government is not in line with the regulation instruments. The policy instrument pushes the project developer to involve three types of communities in arranging EIA document, such as (1) impacted community, (2) environmentalist, (3) every influential decision in EIA process. There, it is not elaborated clearly to whom of the influential decision maker and impacted community are obliged to involve in the EIA process. In the case of *Tampur I* hydropower, this policy instrument and goal show the element of internal policy incoherence. This results in the uncertain feeling of community and regency government to accept this project within their areas.

Furthermore, the location of the business unit or activity planning in the national agenda is not coherent with the regional spatial plans which create social conflict in the field between the local community, regional government and central government as the decision maker. For example policy about National Regional Spatial Plan that is initially purposed to synchronize

and give inputs to the regional spatial, however, it is excluded in the regional regulations. Unpredictable and uncertain due dates of permit assessment process and the results between the instruments and the field demonstrate the temporal incoherence between the policy goal and the articles of different policy instruments. This uncertainty bureaucracy may hamper the interest of investors and local actors for promoting the development of hydropower. For example, the final report of the environmental permit of *Tampur I* hydropower is merely delivered to provincial level and head of *Gayo Lues* regency which Environmental Services office of *Gayo Lues* was not involved in arranging EIA document. PLN, MEMR and provincial government related to this project have given the approval of this project in terms of environmental permits and will have benefits to the development of *Acehnese* Province. Meanwhile, the regency government and local community which is mostly affected are not directly involved in the process of EIA document, as written down in the articles of policy instruments.

5.4 Energy production

Considered as one of the renewable energy source alternatives, the energy policy and regulation is regarded as the most influential sector to the investment of energy infrastructure sector. Renewable energy investment is regarded as a means to accelerate the electrification rate for the Indonesian government. Investment and power purchasing policies and regulations have been a deep concern in particular for foreign IPP or energy investors. Most IPPs mainly pay attention to the power purchasing process and mechanism with PLN as the single electricity distributor in Indonesia. In the electricity energy supply sector, the policy instrument (*Permen ESDM* No. 50/2017) is oriented to the interest of PLN as a single buyer from the developed energy power plant built by private IPP. This policy means PLN is legally obliged to buy electricity energy from renewable energy power plants, including hydropower. The structure of Indonesian electricity supply industry positions PLN as the only institution with the only authority to purchase electricity from IPP and supply it to the people (IAEA, 2017). PLN owns most electricity infrastructure and market in the country (see Fig.12) to deliver, distribute and service the electricity networks.

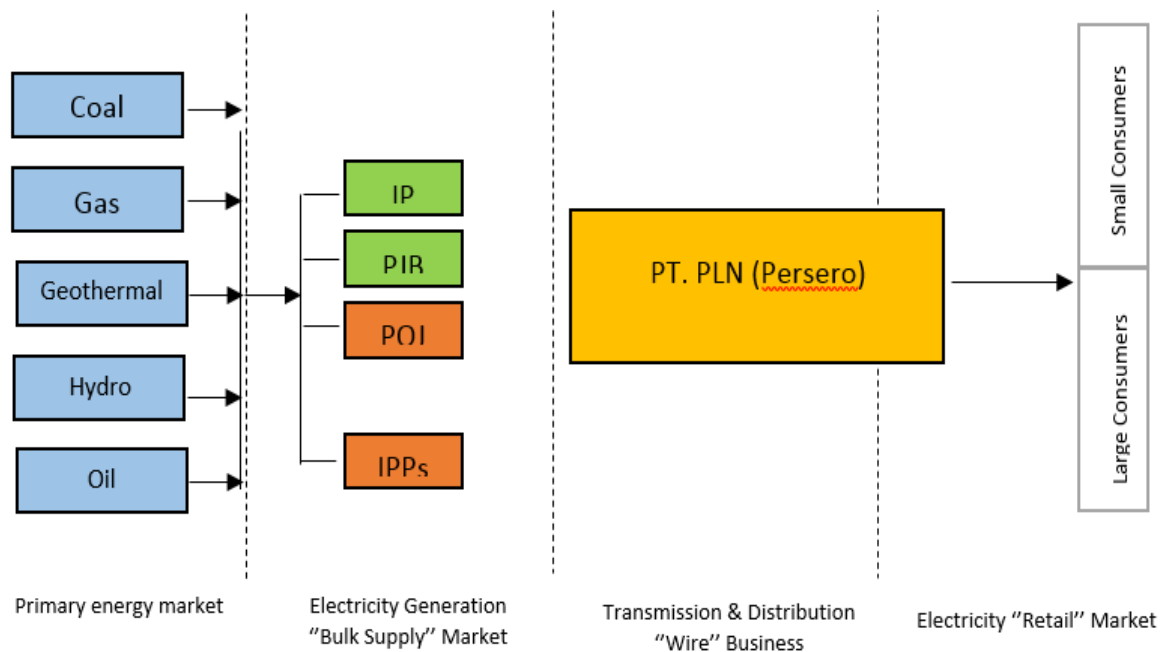


Figure 12. Indonesian electricity market (IAEA, 2017)

Within the previous regulation (PP No. 14/2012) regarding the electricity supply business unit, PLN applied the mechanism of direct designation to assign the IPP to a particular project. Since *Permen ESDM* No. 50/2017 has been issued, in Article 4 MEMR has introduced a mechanism of direct selection, which means PLN has authority to invite other IPPs to participate in the selection process. As a result, the probability to run the project goes same between one who has proposed the plan and who does not. Despite the general policy goals and instruments are encouraging the 23 percent of national renewable energy development, and this may lead to the bottleneck for private investment in renewable energy power plants sector. IPP who has proposed the proposal of project development, in the beginning, may face financial losses since a certain allocated budget has been expensed to conduct the initial survey, feasibility study, and design of power plant under the uncertainty of selection mechanism. Another form of mechanism which hamper the IPP to get the project funding is for example BOOT (*Build, Own, Operate, and Transfer*) mechanism (Article 8 (8)).

This mechanism contains controversy among the investors, which results in situations where the power plant project has to be handed over to the government under PLN after a maximum of 30 years period of the contract (PPA) is over. This situation pushes the investors to consider the economic and financial feasibility of the project and agree upon the project less than 30 years. Regarding the role of PLN in the policy instrument, PLN is responsible for reporting the information to the Minister periodically once in every three months or anytime

when it is required. However, the implementation of monitoring and evaluation of private hydropower building is not governed by a clear mechanism or Standard of Operations. For example, according to the interviewed expert interviewees, relevant institution, such as Division of New and Renewable Energy of MEMR is hardly not having strategic roles in interfering with the development of renewable power plant project. In the case of *Tampur I* hydropower, this division has no interference within the whole development process. There is no any official written report provided to this division, which means that the set of the scheme on “who does what” has not been clearly regulated in the policy. Their role as monitor and evaluator is limited as PLN will directly communicate and co-ordinate with PLN, along with *Permen ESDM No. 50/2017*. There is still no clear SOP of interrelation in governing the renewable energy monitoring and evaluation process between and within MEMR, PLN, and other relevant ministries.

From the perspective of temporal policy analysis, policy instruments regarding the investment of renewable energy have had some changes in short period of time. For example, in 2017, the policy instruments regarding renewable energy source utilization and PPA have been amended twice in a year by the government, such as *Permen ESDM No. 12/2017* into *Permen ESDM No. 50/2017* and *Permen ESDM No. 10/2017* into *Permen ESDM No. 49/2017*. Through these changes, governments goal is to re-govern the conditions of risk allocation and force majeure in PPA between PLN and IPP. This may result in risky investment climate for foreign investors with temporal regulations and policies. For example, the land acquisition and environmental permit (*Permen ESDM No. 49/2017*) are no longer under the risk responsibility of PLN, but IPP or business unit. The policy instruments and goals may not meet the needs and participation of local actors in the implementation of hydropower installation. In general, the policy goals and instruments promote the idea of increasing renewable energy power plants in contributing the electricity supply, one of them is building a hydropower plant. However, the national energy target in the policy goals may not meet the needs and participation of local stakeholders. The regulation positions PLN as the central body to have an authority in assigning the PPA with IPP. Involving the local stakeholders in the initial development process is necessary to meet the national target with local demands. The elements of risk responsibility of IPP or business unit which are strongly related to the social conflict with local community, for example land acquisition in the site project needs to be interfered and facilitated by PLN as the own state business with higher social legitimacy. Those demonstrate the signals of vertical incoherence between policy goals and policy

implementations. For IPP or investors, the inconsistent of energy investment (PPA) leads to the access difficulty for IPP to receive the funding project which is the main element of the evaluation process in the direct selection mechanism.

5.5 External policy coherence

The coherence of identified internal and temporal policies have implications for external policy coherence (S. Huttunen et al., 2014). The concept of horizontal coherence is defined as the gap or synergies between the policy domains (Gauttier, 2004; Bossuyt et al., 2018). In the context of renewable energy development and transition in Indonesia, the external implications are brought up by either supportive and unsupportive policy issues. Within the case study of *Tampur I* hydropower, the analysis of the external implications of policy coherence, in this case, is based on the multi-perspectives of involved multi-stakeholders in the project. Here, one policy sector potentially influences the other policy domains. These interrelations between one policy domain and others contribute to the success of *Tampur I* hydropower installation activities. This chapter's analysis showed that energy policy domain acts powerful position to the development of hydropower, with the case study of *Tampur I* hydropower in particular.

This section examines the empirical analysis of synergetic horizontal policies in the case of *Tampur I* hydropower from the perspective of involved multi-stakeholders and relevant policy instruments. Generally, policy goals from relevant domains are encouraging the utilization of renewable energy resource as a means to develop renewable energy power plants in Indonesia, including hydropower. For example, the loan-use forest permit and the omitted element of force majeure in the risk responsibility of private due to the change of government policies trigger the interest of renewable energy power plant investment for foreign IPPs. On the other hand, the internal incoherence also contributes negatively across the sectors. For example, lack of clear monitoring and evaluation mechanism to the private hydropower and instruments to regulate the social externality costs due to private hydropower could be the bottleneck to the situation of *Tampur I* hydropower building process and decrease the interests of local actors to support the project.

In terms of external policy perspective, several incoherence areas found between policy domains within the policy goals, instruments and in the level of implementation. First, poor Standard of Operation or mechanism in terms of co-operation within and across multi-sectors or ministries that results in external policy incoherence in the implementation phase. As an example, between provincial and regency government, the environmental permit can be

conflicted between environmental service office in the regency and provincial level due to regency officials are not provided with the official written report and involved in the initial process of environmental permit request by *Kamirzu* as IPP. Despite the officials are aware of the relevant regulations regarding the participation of local actors. Hence, the environmental regency officials are not updated on the progress if *Tampur I* hydropower development. One of the articles in the environmental policy instrument to increase the social involvement in the forest areal management results in social conflict due to the lack of social awareness the relevant regulations and legislations. This situation forces the government sectors to set up a clear standard of operation in governing the task division and co-operation across the governmental institutions.

The second form of external incoherence in the implementation is poor co-ordination leads to poor information and knowledge exchange about existing *Tampur I* hydropower progress between different sectors and levels of governments. For example, risk analysis element in the environmental permit is not implemented well yet in the regional level. Regency government, according to the interviewed officials are not familiar with the importance of risk project analysis. This might be due to *Tampur I* belongs to the private project, so all permit processes are under the responsibility of *Kamirzu*, so regency government did not conduct any risk assessment and were not familiar with according to the interviewed regency officials. Environmental services office of *Gayo Lues* regency are not aware of the environmental permit process in the case of *Tampur I*, also including to what extent this project has been completed. That situation emerges because none of the collaboration meeting is conducted between the provincial and regency government. The identified external incoherence can be multiplied to the other forms of policy incoherence horizontally.

The third, poor supporting and suitable regulations of economic instruments for local community, for example incentives or compensations for land acquisition as part of externality cost due to private power plants. Compensation for land acquisition in the energy policy domain can conflict with the forest regulations due to poor encouraging and detailed regulations and instruments with regard to responsibility social externality cost in both policy domains. Those instruments are not in line with the energy policy goal and government target to develop renewable energy resources by 23 percent in 2025. Another examples are BOOT implementation in the renewable energy sector may not be supporting each other with environmental permit legislations. In terms of risk responsibility owned by business unit, environmental permit, land acquisition are not under the responsibility of government and PLN,

but IPP's. Then, under the mechanism of BOOT, once the power plant completed, it is transferred to the government's authority. This situation may lead to difficulty of bureaucracy for investors and decrease their renewable investment interests.

Interviewees from different sectors stated that despite the policy goals from all relevant sectors (forest management, water management, environmental protection, and energy production) are coherent, but the main problem lies on the gap between policy goals. Policy goal in one sector is not supported by policy instruments in other sectors, which results in ineffective policy implementation that is the energy sector. The supportive policy goals encourage the development of hydropower, in particular to renewable energy investment to increase the electricity energy supply to locals in the rural and isolated areas. The renewable energy development and investment involve particular problems and challenges in terms of legislation and implementation, such as interrelation and communication between different level of governmental bodies, the legitimacy and authority of PLN in direct selection mechanism, and the effect of implementation of BOOT to investors. These controversies may contribute to and influence the specific particular policy implementation in different sectors, such as forest and environmental management. Mismatches between policy goals and instruments and the implementation within one same sector is regarded as the source of external policy incoherent in the case of *Tampur I* hydropower, in particular with regards to the local actors involvement in the development process.

The table below summarizes the identified renewable energy-related policy instruments from identified different policy domains influencing *Tampur I* hydropower. In efforts to determine if the policy domain is coherent or not internally, externally, and temporally, they are marked with sign of (+) and (-) respectively. A policy is considered as coherent if there is a synergy between policy goals and instruments within and between different policy sectors (Nilsson et al., 2012). Policy coherence is when the policy instruments from different policy domains do not hamper each of policy goals and give clear signals to the actors to act in certain actions in practice (Huttunen, 2015).

Table 5. Summary of identified policy coherence issues with regards to Tampur I hydropower. Coherence is marked with +. Incoherence with - (see full Table in Appendix II).

	Internal	Temporal	External
Forest Management	+ Policy instruments and goals push for hydropower installation for electricity within the forest area	+ Consistent policies and regulations of forest management push the development of hydropower	- Poor SOP of multi-sectoral co-operation - Poor supporting regulations of economic instruments for locals
	-Policy implementation not specify social externalities and wild animal protection due to private hydropower		- Lack of knowledge and information exchange between sectors - Unsupportive BOOT mechanism with other permits from other sectors
	-Gap between policy goal and implementation of hydropower development within forest areal.		- Incoherence between policy goals and implementation +Coherent policy goals between sectors
			+ Supporting all policy domains to renewable energy transition
Water Management	+ Policy goals and regulations push dam building and assure the safety aspects	- Regulations about private hydropower not significantly considered in the policy instruments	
	- No particular articles to govern water sources utilization for private energy power plan (hydropower)		
Environmental Permit	+ Policy goals and instruments push to promote hydropower development	- Gap between implementation and environmental permit issued by central and/or provincial government; less local actors participation	
		- Uncertain and unpredictable due dates of the assessment process in the field.	
Energy Production	+ Policy goals and instruments push to promote hydropower development	Uncertain and inconsistent regulations regarding PPA with investors	

	+ Direct selection and BOOT give limited access to investors	Mismatch between policy instruments, goals, and implementation level	
	+ Unclear SOP regarding monitoring and evaluation		

To conclude, this chapter identifies and finds the policy incoherence in the interplay of policy domains that are relevant to the development process of *Tampur I* hydropower. The area of policy incoherence was found in each of the policy analysis perspectives in every relevant domain. Yet, the area of policy incoherence is primarily identified in the area of external policy which means the synergy between policy goals from one domain and policy instruments from other domains. The external policy incoherence in the case of *Tampur I* hydropower takes place primarily in three policy domains that are forestry, water management, and environmental protection. After identifying the incoherence area of relevant policies in *Tampur I* hydropower, the next chapter subsequently identify the weak points of each function influenced by the policy incoherent that hamper the development process of *Tampur I* hydropower

6. Transition impact of identified policy (in)coherence issues based on TIS functions

In the previous chapter, the relevant policy domains have been identified in the context of policy goals, instruments, and implementation from the perspectives of internal, external and temporal policy tools analysis. Those policy coherence analysis base on the interviewees' account subsequently is identified in each of the relevant system functions with the case of *Tampur I* hydropower.

This chapter aims to shed a light on the transition effects of the identified prevailing policy incoherence in the case of *Tampur I* hydropower development. This empirical chapter seeks to explain the transition impacts perceived from the perspectives of involved stakeholders in *Tampur I* hydropower in the relevant system functions. These functions can be analysed by mapping the involved stakeholders regarding their interest and power, and how they use their power and legitimacy to set up and implement policy and regulations that relate to renewable energy power plant development in Indonesia. Hence, this thesis highlighted the importance of the presence of structural components (actors or stakeholders and institutions in *Tampur I* hydropower development

As the starting point of the TIS approach, it is important to define the focus of analysis. *Tampur I* hydropower development process is empirically focused on technological product field, as Iizuka and Gebreeyesus (2017) analysed the non-traditional agricultural export industries in Ethiopia and Chile. The development of *Tampur I* hydropower is influenced by the performance of relevant multi-sectoral policy domains. The function approach used by Iizuka and Gebreeyesus (2017) is in line with the case of *Tampur I* hydropower in which a specific technological product is selected to be developed. *Tampur I* project focuses on renewable energy technology.

Furthermore, the involvement and networking of multi-stakeholders from the different interest of sectors take part in the process as well. Through incorporating identified policy analysis into the TIS approach, it could aim to understand the role of relevant policies in emerging innovation system process (K. Reichardt et al., 2016), in triggering the development process of *Tampur I* hydropower as a case study. The development and use of technology bring positive impacts to society, but that also often leads to the negative societal and environmental effects (Hekkert et al., 2007). For example, the case study of *Tampur I* hydropower development brings some implications in different sectors of implementation. Using TIS approach by taking one specific particular technology, it helps to explain the technological process and social

structures (actors, institutions, relations) and their performance in the system functions (Hekkert et al., 2007).

After identifying the key relevant policy issues to *Tampur I* hydropower development, the subsequent stage of analysis is to analyse the implications of the identified the degree of coherence between policy goals and implementation in different dynamic system functions. Identified policy issues within the systems aim the policymakers to address what the indicated problems occur (K. Reichardt et al., 2016). Take for the example of the case study in the sectoral system, the development of *Tampur I* hydropower which depends on the social structures, such as involved multi-level stakeholders and different national policy domains. Those either could stimulate or obstruct the efforts in adoption of renewable energy power plant. Some incoherence policy problems of *Tampur I* hydropower lie on the gaps between goals of different policy domains and the implementation level. Those include the monitoring and evaluation procedures between sectoral institutions in the private power plant project and social externality mechanism. These gaps are difficult to be in line with the systemic functions.

TIS approach is purposed to capture identified factors at the sectoral level which influence the function system (Kivima and Kern, 2016). Particularly in the energy system, it inevitably copes with several different challenges and threats concerning demand and supply, prices, purchasing process, and environmental concerns (Kern, 2011). Those abovementioned substantial challenges as well as occur at the development of *Tampur I* hydropower which is faced by the relevant stakeholders either in the national, regional, and local level. Using TIS approach helps to identify the political processes and the institutional contexts to promote the more sustainable energy system, as Kern (2011) took UK and the Netherlands cases as examples of the system innovation by elaborating policy initiatives.

TIS functioning is necessary to aim policy makers to analyse in which policy intervention is needed and what kind of different treatment needs to apply to different policy domains in various functions (Bergek et al., 2008; Wieczorek and Hekkert, 2012; Reichardt et al., 2016). TIS is defined as the social network comprised of actors and institutions which is built up around specific technology (Suurs and Hekkert, 2009). Hence, according to the perspectives of relevant stakeholders, the gaps between underlying policies and technological change process of in *Tampur I* hydropower development occur in the three systemic functions, in which consist of knowledge diffusion, influence on the direct search, and legitimization process.

Focusing on the hydropower case study as the underlying technology development with different sets of actors, networks and institutions incorporated, this chapter of paper will address the functions and systemic problems from the selected relevant sectors and their networking to influence each other in the policy framework. Both positive and negative effects emerged from the development of *Tampur I* hydropower and related to various relevant system functions in related sectors. These system functions could be strengthened or weakened by the level of coherency of policy (Huttunen et al., 2014).

Some policy domains are strongly linked to some of the system functions, on the other hand, some do not. For example, very few identified temporal policy from all relevant sectors linked to the "legitimation" system function. That is shown in the case of *Tampur I* hydropower, from the perspective of policy temporal, the interplay of policy instrument does not change. Other examples of temporal policies from all sectors are no linkage each other with the legitimation system function. These analyses use the actor-based perspectives on how they perceive and well understand the policy goals, instruments, and the extent to which their involvement in the implementation level. Identified actors or stakeholders in the case of *Tampur I* hydropower including their positions, interests, and networking formed in the system were elaborated in the previous chapters as the component of TIS analysis. Three categorizations of stakeholders in national, regional, and the local group of actors show that formal network evolved dominantly in *Tampur I* hydropower development between multi-level stakeholders. As Bergek et al. (2008) stated that formal network is easily recognized, these networks in the case of *Tampur I* hydropower is still lack of standard of operations, in particular between one ministry and another ministry. For example, between directorates within MEMR failed to communicate on a specific standardized mechanism of monitoring and evaluation to a private or IPP's renewable energy power plant, like *Tampur I* hydropower case. Identification of actors and institutions generates the basis for the following stage of TIS approach which is the mapping the functional pattern of the TIS (Bergek et al., 2008). The table below summarize the TIS actor-based analysis in *Tampur I* hydropower development in all relevant sectors.

6.1 Diffusing and exchanging knowledge through networks of *Tampur I* hydropower

The first actor-based TIS system function analysis related to *Tampur I* hydropower is knowledge diffusion. This function is regarded as the main basis of the TIS approach that concerns on the knowledge base to see how well the level of understanding of local actors with regards to knowledge and information base (Bergek et al., 2008). Knowledge diffusion is

defined as the typical organizational structure in a knowledge network which consists of the exchange of information and knowledge and associates with the events as measurements, such as conference, workshops, and alliances (Hekker et al., 2007; Suurs et al., 2010). This system function is measured by perceiving how the provision of training, collaboration and co-operation between sectoral stakeholders are formed in the system. In the case of *Tampur I* hydropower, using TIS approach is proposed to identify the extent to which information and knowledge transfer and exchange occur between multi-sectoral actors, how many seminars held by the higher and more legitimate authority to transfer the knowledge and information concerning the progress of the project to the local community. TIS functions to address several diagnostic questions with respect to type and amount of the networks, such as "*is there enough knowledge exchange across geographical borders, are there problematic parts of the innovation system in the knowledge exchange system*" (Hekkert et al., 2011). In the case of *Tampur I* hydropower development, the extent to which of involvement and co-operation between multi-sectoral actors is measured to fulfil this system function. As this function involves the interaction of different background of actors through various associated types of events (Suurs et al., 2009).

Knowledge diffusion is considered contributing to the fulfilment of TIS functions in *Tampur I* hydropower. All relevant policies with *Tampur I* hydropower are linked to knowledge diffusion function. This is shown by emerging of both two positive and negative transition effects in every sector, forest and water management, environmental protection, and energy production. Knowledge diffusion through networks occur in *Tampur I* hydropower involves the communication and co-operation of multi-stakeholders in different level (national, regional, and local) and background (governmental and non-governmental) of the organization. Through TIS approach, this section identifies how actors or stakeholders perceive the elements that influence the development process of *Tampur I* hydropower according to their position and institutions they belong to by interviewing them. In this function, policy coherence is merely analysed from the perspective of the external dimension. As this function focuses on the knowledge exchange and diffusion, here TIS is merely focused to see how well the information and knowledge flow regarding *Tampur I* hydropower project within and between different policy sectors from the accounts of involved actors. Hence, the temporal policy dimension is excluded from TIS analysis. This is because as policy temporal is perceived from the consistency and predictability, the implementation process of *Tampur I* hydropower is

controlled by the private investor or IPP. The working planning and the construction process is determined by *Kamirzu*'s planning.

The policy goals from all domains are supporting the spreading of renewable energy development in Indonesia. Yet, in the case of *Tampur I* hydropower development, the negative innovation effects came from all relevant multi-sectoral actors. This negative effect is emerged not limited to between sectors only, also within the same sector. For example, in the electricity energy sector, the effect is related to the unavailability of Standard of Operations or mechanism to transfer the knowledge and provide the updated project progress by PLN to Directorate of New and Renewable Energy (MEMR1, 2018). Another example of between different sector is despite *Tampur I* hydropower is considered as a large hydropower project and officially registered in RUPTL 2018-2027, there was no any collaboration and coordination meeting involving not merely PLN, and Directorate of Electrification, but also Directorate of New and Renewable Energy as the main element institution which focuses on renewable energy development projects in Indonesia (MEMR1, 2018). There was no co-ordination meeting to discuss the feasibility of the project, including the preparation, mitigation, monitoring and evaluation steps. According to the interviewed expert interviewee, this resulted in difficulty to monitor the project as this system function did not work well in terms of knowledge and information exchange flow under the same institution which is MEMR (MEMR2, 2018). This condition is written in *Permen ESDM* No. 50/2017 Chapter VII mentions that PLN ins obliged to provide regular report to Minister of ESDM in every three months or certain required conditions.

Practically, there is no national standard in determining the scale of hydropower and renewable energy calculation methods to estimate the total amount of energy mix in Indonesia (MEMR1, 2018). The terminological definition of hydropower based on the scaled magnitude refers to Indonesian government only which does not significantly cover the definition in the implementation. For example, during the international summit of energy, there are several different categorizations or type of hydropower based on its scale magnitude, which makes difficult to determine if Indonesia has fulfilled the international target of renewable energy transition development. This unstandardized legislation may influence innovation-trigger effects on the policy goals to reach renewable energy target in internal and external policy incoherence. This way the national target of renewable energy of Indonesia by 23 percent can be hindered.

Another form of unsupportive policy implementation in this function is the lacking number of seminar and collaboration meeting with the local community in *Lesten* village. Despite the seminars had been conducted for three times, it was merely held in the first month of pre-survey activity by regional government (RG4, 2018). FMU under regional government socialized to the local people regarding the initial propose, planning, and benefit of *Tampur I* hydropower project, including relocation area selected by *Kamirzu*. This means the seminar is not regularly and continuously in the upcoming months during a year by either regional government or collaborating with *Kamirzu*. This was strengthened by poor collaboration meeting between *Kamirzu*, provincial and regency government (RG5, 2018).

In 2017, there was only one coordination meeting held between *Kamirzu*, regional, and village government before the survey activity started (LC1, 2018). The meeting visited and discussed the survey of relocation area for local people by inviting 20 of them. Despite the meeting addressed the urgency and purpose of loan-use permit, yet multi-stakeholders collaboration meeting was no longer initiated by *Kamirzu* and the regional government side. As example, there is no copy of semester report provided by *Kamirzu* to regency government under Environmental Services office of *Gayo Lues*. This results lack of coordination within the regional government between provincial and regency government. These negative innovation effects emerge since the policy instruments in energy sector regulates that social externalities, such as land acquisition and environmental permits, are under the responsibility of business unit which is, in this case, is *Kamirzu*. Those reports are delivered to PLN as the only institution who agreed and signed up the contract with IPP. This unsupportive policy instrument discouraged the knowledge diffusion process in the implementation.

The failure of matching between policy goals and resulting internal and external policy incoherence mainly drives force the negative innovation effects in the system functions practically (Huttunen et al., 2014). Same case goes with the case of *Tampur I* hydropower. The table below shows several points of weakness of each sectors found in the knowledge diffusion function which influence the development process of *Tampur I* hydropower.

Table 6. Identified transition effect of internal, external, and temporal policy incoherence of Tampur I hydropower in knowledge diffusion function.

System function	Knowledge difussion through networks		
	Internal	Temporal	External
Forest management	Support for the development of hydropower from all policy domains (+), Poorly exchanging knowledge, information, and co-operation between different sectoral		
Water management for hydropower			

Environmental permits	ministries and officials both in central, regional government, and local people level (-)
Hydropower for electricity energy supply	

The lack of policy instrument and poor standard of operations regulating knowledge and information exchange and sharing occur within and between multi-sectoral stakeholders, in particular officials in central, regional, and local levels. These poor policy instruments for the renewable energy knowledge diffusion in electricity energy production force the regency and village governments to dig the information and knowledge, for example, the importance, benefits, and impacts of *Tampur I* hydropower by themselves unless they are not well-informed regarding the progress. The negative effects of this system function clearly occur on the poor applicability of policy instruments with regards to the scheme of co-operation and collaboration between stakeholders. Yet, those negative innovation effects also hinder the communication and coordination between directorates or divisions in the same institution, like MEMR. Thus, the internal and external incoherence between policy instruments and implementations, in particular within energy production for electricity and forest management, is the main driving force to poor knowledge and updated information exchange regarding the progress of *Tampur I* hydropower.

6.2 Influential expectation, targets, and expected outcomes of stakeholders

Second relevant system function with the case of *Tampur I* hydropower is guidance on the direct search. This function refers to sort of beliefs, process, and activities set to fulfil the expectations, achieve the targets, and facilitate the convergence in the transition processes (Markard and Truffer, 2008; Suurs et al., 2010). The transition processes include how organizations or stakeholders set the visions, missions, expectations, strategies, regulations, and policies (Jacobsson and Bergek, 2011). In the case of *Tampur I* hydropower development process, it is important to identify what policy targets, strategies, and regulations from different relevant sectors that either support or hamper the implementation process. The function of guidance on the direct search aims to see if the expected outcomes from different relevant policy domain trigger or discourage the decision to start the implementation process of *Tampur I* hydropower. For example, what the expected target of MOEF to issue loan-use policy with regards to energy power plant installation. Thus, this section addresses the goals and strategies set by the involved stakeholders in *Tampur I* hydropower development, including their each of targets, regulations, restrictions, or standards with respect to *Tampur I* hydropower

development process. In the case of *Tampur I* hydropower from, this system function emerges both either the triggering or discouraging effects that influence the development process of *Tampur I* hydropower. Those effects involves internal, external, and temporal policy incoherence in all relevant policy domains.

In the context of policy internal analysis, general policy goals and regulations are supporting the development of *Tampur I* hydropower. The policy instrument set by the government under MOEF to govern the specific non-forestry activities is the proof of MOEF to trigger the spreading of renewable energy power plant increasing in Indonesia (MOEF2, 2018). The poor implementation of policy instrument results in policy incoherence. As the example, the formation of specific regulation with regards to enabling certain non-forestry interests, such as electricity power plant to be built within the forest areal. The called loan-use permit created internal coherence. This regulation gives access to the energy sector to increase the number of renewable energy power plant established within and around forest areal. Yet, poor applicability of externality costs, including lack of regulation regarding the wild animal protection and compensation condition in the regulation bring the incoherence between policy goals and implementation. This has actually slowed down the hydropower development process and create a misconception of the importance of renewable power plant for local people in rural areas. This followed by the understanding gap towards the national policy and regulation between the central government and regional government (MOEF2, 2018).

In the policy domain of water management, the negative effects in the function system of *Tampur I* hydropower development are generated by the internal and temporal incoherence in water management policy and regulation. The policy goals support the acceleration of hydropower development in Indonesia, yet those are not articulated in the MOPW vision, mission, and strategy. As an example, hydropower is not the main priority of MOPW or central government to build a dam for public sake, so there is no specific division which focuses on dam building for hydropower (MOPW2, 2018). The main purpose of dam building across Indonesia set by MOPW is mainly for increasing the number of irrigation system particularly in rural areas (MOPW2, 2018). Also, the dam management for hydropower regulation discourages the private hydropower investment which provides fewer services to private investor or IPP to build a dam for hydropower. MOEF has set a strict standard assessment of dam building for any purposes. Meanwhile this standard to fulfil for private investors is not accompanied by supporting guarantee or regulations. Construction permit and design certificate

for *Kamirzu* is lack of supporting policy instruments to trigger the development of *Tampur I* hydropower.

In the environmental protection sector, open public protest regulation triggers the development of *Tampur I* hydropower development, which local people can directly participate in the decision-making process, either supporting or opposing the project. That creates the positive triggering effect to stimulate non-state organization and local people supporting and spreading the urgency of *Tampur I* hydropower and other technological innovations that enter to their living area (LC1, 2018). Yet, this regulation is not reflected in the practice of *Tampur I* hydropower development case (HP2, 2018). The lower interest and power level of the local community in *Lesten* influence their bargaining position in the decision-making and development process of *Tampur I* hydropower (HP1, 2018; HP2, 2018). The mismatch between policy instrument and policy implementation brings the negative innovation effects towards the development of *Tampur I* hydropower. The trust between regional government and central government regarding the environmental permit process of *Tampur I* hydropower decreases (RG5, 2018).

One one hand, in the energy sector, the positive triggering effect followed by the supportive policy goals and targets set clearly by the central government under MEMR to promote renewable energy transition innovation through RUPTL 2017 and 2018. That fact is articulated by the high interest of MEMR on *Tampur I* hydropower development. Yet, on the other hand, the unsuitable policy instruments with regards to the investment and purchasing agreement (PPA) of renewable energy projects has become a negative trigger for the bureaucracy process. Direct selection and BOOT regulations force the investors to transfer the power plant to PLN once it's completed and minimize the conflict during the pre-construction (PLN1, 2018). The implementation of this regulation drives the failure to trigger investors in investing in the renewable energy power plant project, since who has not conducted any survey can take over the project (MEMR1, 2018). In the case of *Tampur I* hydropower, *Kamirzu*, has to foresee and accelerate *Tampur I* hydropower project before the due date of the project with their own and government financial budget (PLN1, 2018). Central government under MEMR has set national energy target in RUPTL 2017 and 2018 which includes the list of ongoing and planned, either private or public projects. Yet, the implementation of strategies for private projects is not regulated clearly in the policy instruments (MEMR1, 2018). Those gaps in policy implementation between central and regional government are considered to bring negative

innovation effect on the *Tampur I* hydropower, where poor implementation of national policy targets occur in the regional level.

Besides internal, temporal policy also produces innovation effects towards the development of *Tampur I* hydropower. The consistency and predictability of policies influences either the positive or negative innovation effects of *Tampur I* hydropower building in the implementation. For example, the regulations related loan-use permit in the forestry sector. This regulation consists to aim to accelerate the permit bureaucracy process for the investors and other business units to have non-forestry interests in the status of forest area, such as hydropower. MOEF has been showing the commitment to promote the renewable and sustainable energy development by set the national regulation and restriction of land use according to the status division of forest area (MOEF 1, 2018). The government's concern and commitment had been shown since the legislation regarding the forestry sector issued in 1999, which as well regulating the utilization of forest area for non-forestry interest activities under certain conditions. This way, temporal policy coherence in forest sector creates positive innovation effect of *Tampur I* hydropower. IPP is well informed and not vulnerable due to the dynamic changing or regulation and target set by the government in order to protect the forest. The main concern of MOEF has been set very strictly. For example, MOEF allows any forest utilization for development activities, such as electricity sector by opening access to forest area for power plant building as long as the ecosystem is still preserved (MOEF4, 2018).

Similar to the forestry sector, water management has clear and consistent policy targets with respect to promoting the water source utilization from the perspective of temporal policy analysis. Yet, the policy instrument of dam building excludes the dam utilization for hydropower building development. The regulation leads the investor to the unpredictable risk situation solving since in particular, it provides an unclear mechanism of dam building for hydropower that belongs to private project or IPP. The risk responsibility of dam construction by private actors is not regulated in the policy instrument and under the coverage of the dam division in MOEF (MOEF2, 2018). The policy target and of MOPW to construct dam for not only limited to irrigation and mining, but also hydropower is incoherently articulated in the policy instruments and regulations. The expectation of MOPW for *Kamirzu* to be able to build a dam under the standardization set by MOEF may not deliver the clear signal of supporting regulation for *Kamirzu* on what kind of action or activity is allowed and not to develop a dam for *Tampur I* hydropower. For example, the sub-division of utilization collaboration in MOPW has no idea of what *Tampur I* hydropower project as the status of *Tampur I* hydropower belongs

to private (MOPW1, 2018). Here, the policy instrument at the system level already set, however, it is not overarching dam construction for private hydropower like *Tampur I* case and providing a clear standard of dam construction mechanism (MOPW2, 2018).

Different from forest and water management sector, in the environmental protection sector, the regulation with regards to the time period of environmental permit documents is incoherent with the assessment process in the field. For example, from the temporal policy perspective, despite the time period of the environmental permit has been regulated, yet in the implementation level, the environmental permit assessment period is unpredictable. The delay of environmental permit document influences the delay of other permits to start the construction process of *Tampur I* hydropower. This situation forced *Kamirzu* to delay the other construction activities before the environmental permit from the head of *Gayo Lues* regency is officially issued (RG5, 2018). The temporal policy gap between policy instruments of environmental permit and the practical implementation leads to the unpredictable time period of environmental permit assessment for *Kamirzu*. The unpredictability creates the regulatory pressure to *Kamirzu* to complete the environmental permit process to be able to continue the other assessment processes during the pre-construction phase.

The same goes for the energy sector, where the inconsistency of principle of power purchasing agreement also may bring the negative innovation effects of *Tampur I* hydropower development, which leads to the uncertainty of future investment. The alteration of policy instrument regarding PPA leads to unclear development goal for *Tampur I* hydropower, in particular for *Kamirzu* as the IPP. Thus, the negative effects of temporal policy incoherence in this system function mostly appeared in the environmental and energy sector, especially with regards to permit assessment and PPA process, which may lead to unpredictable and uncertain investment atmosphere for IPP with the inconsistent of policies and regulation. In the context of external policy analysis, the most observable positive innovation-triggering effects are in the energy sector, where the energy policy goal to spread the renewable energy development, particularly hydropower project fulfil the requirements in the policy instruments from the other sectors. The national energy target to increase by 23 percent is supported from the other sector's targets, vision and mission. For example, the construction of *Tampur I* hydropower development is not able to start before the permits documents in terms of loan-use, dam construction, and environment issued. Meanwhile, the negative innovation effect of *Tampur I* hydropower in this system function is also emerged followed by the incoherence of policy implementation between the policy domains from all sectors, including the energy sector.

The regulation exists but fails to meet the policy goals in other sectors which results in creating the failure of the expected outcomes to meet policy implementation.

Table 7. Identified transition effect of internal, external, and temporal policy incoherence of Tampur I hydropower in "influence on the direct search" function.

System function	Influence on the direct search		
	Internal	Temporal	External
Forest management	In general policy goals and regulations are supporting the development of renewable energy (e.g. hydropower) as one of the non-forestry activity within the forest areal (+)	Temporally consistent policy and regulations for increasing the investors entry to develop hydropower in forest areal. (+)	Generally coherent policy goals from all domains for renewable energy transition (+), Incoherent poor policy implementations between domains create incoherent unsupportive policy goals in other domains (-),
Water management for hydropower	Supportive policy goals and regulations for the safety of dam, but regulations contain governance of water source utilization for private hydropower project discourage (+/-)	Consistency on policy and regulations for promoting the water sources utilization, but not particularly elaborating hydropower development (+/-)	
Environmental permits	Supportive policy goals for renewable energy development permits in general, but open public protest may be influencing the environmental permit results in practice (+/-)	The implementation of uncertain and unpredictable changes in time period of environmental permits documents assessment process in the practice may hamper the construction period (-)	
Hydropower for electricity energy supply	Supportive and positive policy instruments and targets push the hydropower development as one of renewable energy producer (+)	Changing or inconsistency of principles of power purchasing agreement (PPA) may cause the uncertainty for future investment (-)	

The policy incoherence in the system function of influence on the direct search is mostly noticeable in forestry, water management, and environment sectors. Each policy domain has own targets and strategies to fulfil the goals, yet the outcome of the implementation of *Tampur I* hydropower is not as expected as the stated targets. The policy implementation clashes with the policy goals and targets which is lack to trigger the development of *Tampur I* hydropower from the perspective of the actors, in particular investor or *Kamirzu*. The issue of uncertainty

and unpredictability of set target, policies, and regulations inhibits *Kamirzu* to pass through the bureaucracy legal steps of *Tampur I* hydropower development process. The lack of incentive for local community and government to support the *Tampur I* hydropower development also creates the social tense that becomes one of an issue in the construction site.

6.3 Legitimacy and social acceptance of *Tampur I* hydropower

Besides knowledge development and transfer, targets and strategies, the third system function which is relevant with *Tampur I* hydropower is the creation of legitimacy. As Wieczorek et al. (2013) stated that innovation system emphasizes the interaction between actors influence the speed and direction of the technological change process. The interaction set between involved actors in *Tampur I* hydropower and relevant rules influence *Tampur I* hydropower process in the site, including the duration of the construction process, the permit procedures, and the social acceptance by the community. The emerging technology leads to social tension and resistance from a certain group of stakeholders who are against or supporting the process. Using this system function aims to identify the conflicting interest around the development process, also pressure on actors in power who are either pro or contra towards the technological change process (Suurs and Hekkert, 2009). As stakeholders analysis has been conducted in the previous chapter (Chapter 4), the level of legitimacy of involved stakeholders in *Tampur I* hydropower has been identified using stakeholders matrix. The higher level of power a stakeholder has, the higher legitimacy they have. The level of legitimacy is required for actors as a commitment to conduct the development process of innovation (Wieczorek et al., 2013; Reichardt et al., 2016). Through identifying the contribution of legitimacy level of actors, this aims to identify on how formal and informal institutions from different sectors, such as visions, missions, and programs increase their legitimacy of *Tampur I* hydropower development. Within this way, it helps to perceive to what extent the national government regulations from other relevant sectors see *Tampur I* hydropower as one of the means to develop the renewable energy in Indonesia set by MEMR in RUPTL 2017 and 2018. Also, this system function identification aims to perceive any societal acceptance or opposition from the local stakeholders to build *Tampur I* hydropower project.

In terms of legitimacy creation function, the transition effects of *Tampur I* hydropower is clearly observable in the internal and external policies. The legitimacy strongly depends on the extent to which *Tampur I* hydropower project contributes to meet the 23 percent of the national renewable energy target in the Indonesian energy sector. In the perspective of internal policy,

forestry, environmental permits and energy supply are the sectors where dominantly the transition effects come from. In the forestry sector, the negative effect is followed from the discouraging social externality regulations due to private hydropower project. This way, the social acceptance of the project decreases. First, the bureaucracy process is considered as the bottleneck from the perspectives of expert interviewees that hampers the development project process (MOEF2, 2018). For example, the central government has set clear regulations and policies, yet the implementation is not articulated clearly in the regional government and grassroots level. Second thing, discouraging and assuming that the bureaucracy and procedures are complex considered as the factor of negative innovation effect in the forestry sector (MOEF2, 2018). In terms of permission, *Tampur I* hydropower involves many sectoral permit requirements from different policy domains, including forestry, water management, environment and energy sectors.

In MEMR, as dam of *Tampur I* hydropower locates within the protected forest area, *Kamirzu* is obliged to have loan-use permit according to the legislation of forestry. This loan-use permit is issued officially by MEMR, but the process is getting complex by practically involving and depending on the role of provincial and regency government, and another permits from another sector. For example, the loan-use permit first step is begun from the principal permit of Governor, as the head of the provincial area (RG5, 2018). That means, *Kamirzu* is not allowed to enter the site and start the pre-construction project in the field before getting the approval from Governor, in terms of survey, feasibility study, and drilling processes. In the permit procedures, *Gayo Lues* regency did not take significant and direct participation, yet limited to receiving the semester working report. That report is not in the form of an official written report, but merely verbally delivered by *Kamirzu*. Subsequently, after holding the Governor principal permit, head of *Gayo Lues* regency instructed the Environmental Services office of *Gayo Lues* to open access for survey request, identify expected incomes and feasible losses, and facilitate between *Kamirzu* and local people with respect to the project. Principal permit plays a very important role in *Tampur I* hydropower development. This way, another survey activities could not be started if this permit has not been issued by governor and head of *Gayo Lues* regency.

Another required technical permits for loan-use document also comprises environmental permit, EIA document, and technical consideration from Director General of MEMR (MOEF1, 2018). The feasibility study is conducted before proceeding loan-use permit and purposed to assign the location of *Tampur I* hydropower. Yet, MOEF currently has not issued any policy

instruments and regulations with regards to the monitoring of survey and feasibility study that is now still conducted independently by IPP. This way, the negative innovation effects are not merely followed from the internal policy incoherence, also regulations in forestry sectors failing to meet policy goals from the environmental sector which puts environmental protection as the priority. The policy instruments and regulation from MEMR are not integrated yet with the environmental permit procedures (see Fig.13), which results in confusing the local governments and local community especially *Harimau Pining* NGO to complement the existence of *Tampur I* hydropower.

Besides MOEF, *Tampur I* hydropower involves full of diverse interests from the different group of actors, for example, MOPW and MEMR. In the water management sector, MOPW can issue the dam construction permit if the loan-use permit has been approved by MOEF (MOPW1, 2018) (see Fig.13).

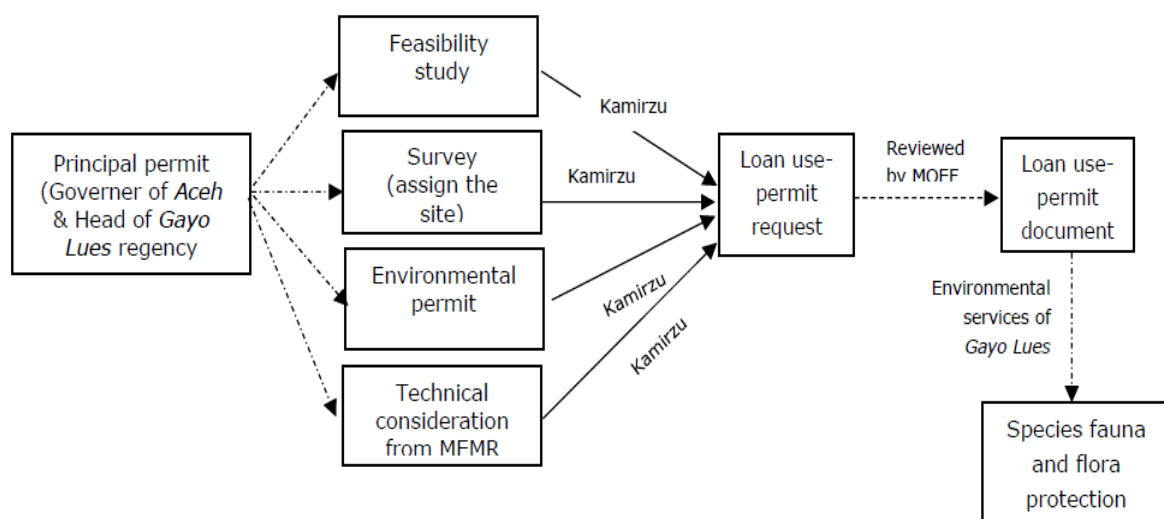


Figure 13. Loan-use permit procedures of *Tampur I* hydropower in MOEF (Source: Author)

Yet, *Tampur I* hydropower permit request from *Kamirzu* has not been received to MOPW. The compliance of *Kamirzu* with relevant permit processes is not completed yet and still far away achieved from the construction phase (RG4, 2018), which eventually delay the whole development process of *Tampur I* hydropower, either for *Kamirzu* and local people in *Lesten*. Similar with the environmental sector, *Kamirzu* also has to pass through EIA to get the approval of environmental permit as one of the technical requirement of the loan-use permit. This means the policy implementation of loan-use permit regulation requires the integration of policy instruments between forestry, water, and environment.

Generally, in the energy system, there are two influential institutions playing an important role, which are MEMR and PLN. In the context of *Tampur I* hydropower case, PLN plays the key role compared to MEMR which put high interest on the renewable energy issue but has a lower level of the role in the site project, in particular, private hydropower project in a specific region like *Lesten* village. Yet, MEMR is still more legitimate compared to PLN in terms of regulation and policy issuing. For instance, from the perspective of PLN, PLN has no authority to monitor and evaluate IPP like, since the responsibility of PLN is to supervise, monitor, and evaluate power plant projects belong to PLN merely (PLN2, 2018). In the perspective of MEMR, *Tampur I* hydropower should be under the coverage of PLN the administrative and technical issues become the interest between PLN and *Kamirzu* in practical (MEMR1, 2018; MEMR2, 2018). This results in the confusing policy bureaucracy either for IPP or local people to whom they have to give reports and exclusion of local governmental institutions and NGOs during the development process.

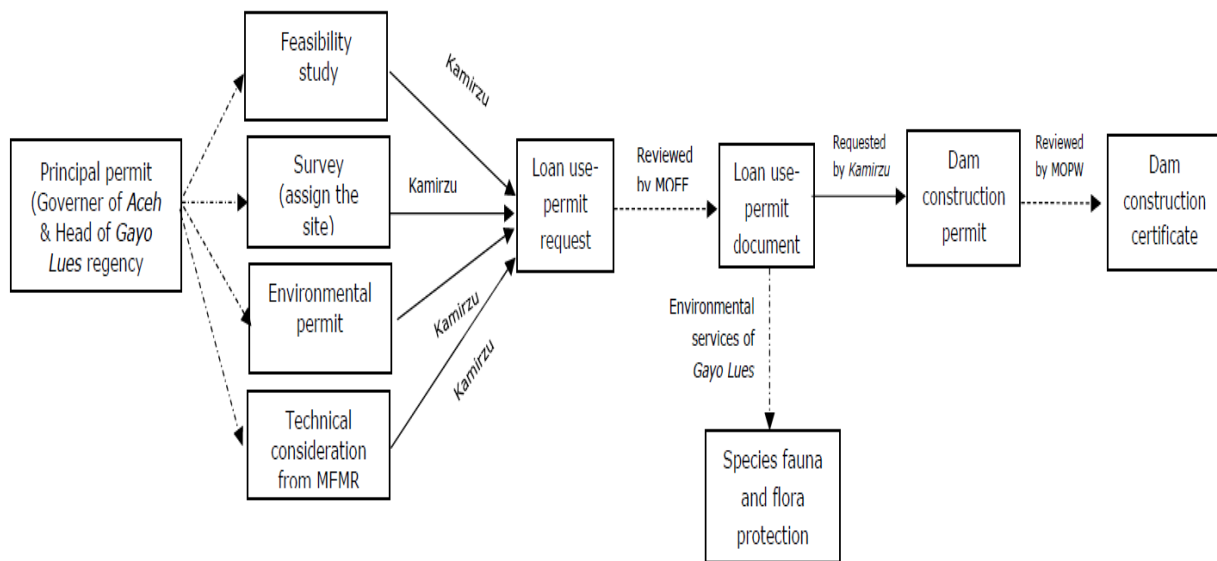


Figure 14. The permit procedures of *Tampur I* hydropower in MOEF, MEMR, and MOPW.

The bureaucracy procedures of *Tampur I* hydropower lies not only in the level of central government, but also in the regional government. There are certain permit procedures that have to be fulfilled by *Kamirzu* before starting the construction of *Tampur I* hydropower. As the principal permit is the first door of all permits to start the construction project, *Kamirzu* subsequently has to request for land suitability permit (RG6, 2018). This permit means to ensure the suitability *Tampur I* hydropower project with the regional spatial land. The land suitability permit should be submitted by *Kamirzu* to and will be assessed by regional development agency

of *Gayo Lues* regency. Another obstacle during *Tampur I* hydropower development in the level of the regional government is with regards to the governor of *Aceh* transition. *Aceh* province has just selected new governor which automatically change the governments' vision, missions, and targets, including influencing the development process of *Tampur I* hydropower (RG6, 2018). The changing of regional governance and regulations in terms of forest management and energy supply may decrease the legitimacy of *Tampur I* hydropower development, as it will follow the vested interests of the incumbents or dominant coalition in the system.

In the external policy perspective, the process of whole permit procedures take considerable time and is not coordinated between relevant sectors. The permit procedures are not integrated between one sector and others. Thus, the each of the institutions is not updated with the work plan, detail, and progress of *Tampur I* hydropower. This way makes the legitimacy of promoting hydropower development decreases due to the mismatch of policy implementation in the energy sector with all relevant policy instruments and regulations from forestry, water management, and environmental sectors.

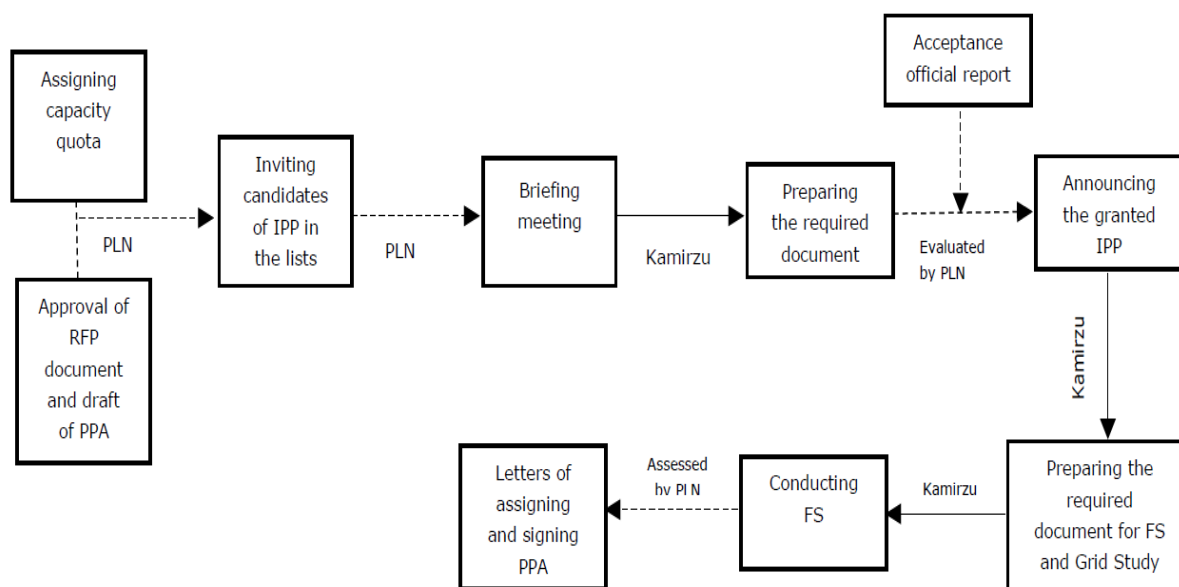


Figure 15. Selection of IPP and signing PPA procedures between IPP and PLN (Source: adapted from PLN's business flow chart, 2018).

From the discussions above, this section finds there several identified point of weakness in legitimacy due to the lack of policy coherence with regards to the development of *Tampur I* hydropower. The weaknesses in this function are mostly found in the internal and external policy which hamper the implementation process of *Tampur I* hydropower which describes in

Table 8. In terms of policy temporal, the transition impact found in the energy sector, since energy is the key sector playing in the development of *Tampur I* hydropower.

Table 8. Identified transition effects of internal, temporal, external policy incoherence of Tampur I hydropower in legitimization function.

System function	Legitimation		
	Internal	Temporal	External
Forest management	Discouragement of specific regulations social externalities due to private hydropower project discourage may decrease the social acceptance of hydropower development for local stakeholders (-)		Coherent policy goals may have increased the legitimacy of hydropower development (+), Incoherent policy implementation may have decreased the legitimacy for promoting hydropower development (-)
Water management for hydropower			
Environmental permits	General policy goals and environmental permits may have increased the legitimacy to push hydropower building (+)		
Hydropower for electricity energy supply	General policy goals and instruments may increase the legitimacy of hydropower development, but BOOT tariff and direct mechanism create ambiguous policy implementations for the investors (+/-) Changing PPA regulations (-)		

This section concludes that the legitimacy of *Tampur I* hydropower can be weakened as the consequence of the weaknesses of and poor implications of internal and external policy from all relevant domains, especially the energy policy domain. Jacobsson and Bergek (2011) stated that the legitimacy comprises the social acceptance and compliance with relevant institutions to make system functions work. Here, in the case of *Tampur I* hydropower, the role of governmental institutions is very important in the implementation process to increase the legitimacy of *Tampur I* hydropower from the perspectives of involved stakeholders. The lack of legitimacy of *Tampur I* hydropower development process is driven by the policy incoherence

in the relevant system functions in *Tampur I* hydropower system. For example, the function of knowledge diffusions, such as lack of collaboration meeting and co-operation among the key stakeholders, and the function of influence on the direction of search, which different targets from different sectors are not intertwined. Those lead to incoherence of policy, regulations, and strategies issued by each of stakeholders in different domains. In the end, the legitimacy level of *Tampur I* hydropower is weakened from the perspectives of the local community or non-state actors since the relevant policy instruments and implementation meet with the vested interests and fail to fulfil the policy goals.

After discussions of each function that relates to the implementation process of *Tampur I* hydropower, in sum, this chapter summarizes all the identified weaknesses in selected relevant functions (knowledge diffusion, influence on the direct search, and legitimacy) of policy internal, external, and temporal in relation with *Tampur I* hydropower development process (see Table 9). The next chapter discusses the analysis result of this study which gives brief answers of this study's research questions.

Table 9. Identified transition impacts of internal, temporal, and external policy incoherence from stakeholders' perspective in TIS framework for policy analysis. Positive triggering effect is marked with (+) and a negative with (-).

System function		Forest management and protection	Water management for hydropower	Environmental permits for hydropower	Hydropower for electricity energy supply
Knowledge diffusion through networks	Internal Temporal External	Support for the development of hydropower from all policy domains (+), Poorly exchanging knowledge, information, and co-operation between different sectoral ministries and officials both in central, regional government, and local people level (-)			
Influence on the direct search	Internal	In general policy goals and regulations are supporting the development of renewable energy (e.g. Hydropower) as one of the non-forestry activity within the forest areal (+)	Supportive policy goals and regulations for the safety of dam, but regulations contain governance of water source utilization for private hydropower project discourage (+/-)	Supportive policy goals for renewable energy development permits in general, but open public protest may be influencing the environmental permit results in practice (+/-)	Supportive and positive policy instruments and targets push the hydropower development as one of renewable energy producer (+)
	Temporal	Temporally consistent policy and regulations for increasing the investors entry to develop hydropower in forest areal. (+)	Consistency on policy and regulations for promoting the water sources utilization, but not particularly elaborating hydropower development (+/-)	The implementation of uncertain and unpredictable changes in time period of environmental permits documents assessment process in the practice may hamper the construction period (-)	Changing or inconsistency of principles of power purchasing agreement (PPA) may cause the uncertainty for future investment (-)
	External	Generally coherent policy goals from all domains for renewable energy transition (+), Incoherent poor policy implementations between domains create incoherent unsupportive policy goals in other domains (-),			
Legitimation	Internal	Discouragement of specific regulations social externalities due to private hydropower project discourage may decrease the social acceptance of hydropower development for local stakeholders (-)		General policy goals and environmental permits may have increased the legitimacy to push hydropower building (+)	General policy goals and instruments may increase the legitimacy of hydropower development, but BOOT tariff and direct mechanism create ambiguous policy implementations for the investors (+/-)
	Temporal				Changing PPA regulations (-)
	External	Coherent policy goals may have increased the legitimacy of hydropower development (+), Incoherent policy implementation may have decreased the legitimacy for promoting hydropower development (-)			

7. Analysis and Discussion

This chapter analyses and discusses the result of research according to the previous chapters. This chapter consists of three part of discussions and analysis. First, it briefly explains the stakeholders' impact on *Tampur I* hydropower development process. Second, the importance of the compatibility of a set of multi-sectoral policies influences the involved stakeholders' decision with regards to *Tampur I* hydropower development process. Third, it explains the relation between policy incoherence in different policy domains and emerging *Tampur I* hydropower effects from the perspectives of involved stakeholders which influences the development process of *Tampur I*.

7.1 Stakeholders' impact on *Tampur I* hydropower development process

In this section, the stakeholders' impact on *Tampur I* hydropower is analysed and discussed. The result of Chapter 4 has showed that involved stakeholders are spread in each of stakeholders mapping matrix in the case of *Tampur I* hydropower. The stakeholders' interest, role, power, influence and legitimacy of *Tampur I* hydropower are analysed to identify their impact on the development process of *Tampur I* hydropower. Here, the result of expert and stakeholders interview are used to analyse the case study in the implementation level.

The result of Chapter 4 showed that different sectors and levels of stakeholders are involved in the development process of *Tampur I* hydropower. The group of involved stakeholders in each of position and the assessment as key or influential is presented in the table below.

Table 10. Analytical stakeholders matrix in *Tampur I* hydropower development

Involved stakeholders	Power	Interest	Position	Assessment
MOEF	High	High	Support	Key
MEMR	High	Medium	Support	Key
MOPW	High	Medium	Neutral, Support	Key
PLN	Medium	High	Support	Key
Regional government	Medium	High	Neutral, Support	Key, Influential
Local NGOs	Medium	High	Support and Opposition	Key, Influential
Local community	Low	Low	Support and Opposition	Influential

The stakeholders in the table above are from the different level of societal groups. The identified level of power and stake or interests, also the position towards the development process of *Tampur I* hydropower are used to investigating whether the stakeholders are defined as the key or influential stakeholder. Key stakeholders are those who act as players who have both direct and indirect influences on the outcomes and control the issues in the number of ways (Brouthers and Bamossy, 1997). According to the identification of importance and the power of the involved stakeholders of *Tampur I* hydropower development in the power-interest grid (see Chapter 4), most of the involved stakeholders in *Tampur I* hydropower development are considered as key stakeholders. Key stakeholders of *Tampur I* hydropower come from different policy sectors. This supports the statement of Reed et al. (2009) that tensions arise when the key stakeholders have conflicting interests. All keys stakeholders are from governmental institutions in the central level of government which have different policy interests but play important roles in the same project which is *Tampur I* hydropower development.

In conclusion, the completion of *Tampur I* hydropower development process requires support from the key stakeholders not merely in the policy-making level, especially also in the implementation level of policy instruments. Despite *Tampur I* hydropower belongs to the private project, the role of key stakeholders is still the most influential and necessary to monitor and evaluate the implementation process of *Tampur I* hydropower. This is because the key stakeholders who have authority to issue national policies that influence the development and transition process of *Tampur I* hydropower, including *Kamirzu*'s investment activities and plans.

7.2 Poor implementation of policy instruments regarding *Tampur I* hydropower

Cejudo and Michel (2017) stated that one of the ways for policymaker to make a set of policies coherent for solving the problem is by creating coherence among policy objectives, instruments, and target population in the implementation from different policy domains. *Tampur I* hydropower is one of the cases where one specific issue is influenced by not only different stakeholders, also different policy domains. Every stakeholders' decisions and actions will influence the implementation process of *Tampur I* hydropower; moreover, most of the stakeholders are categorized as key actors with the high level of power, authority and legitimacy. It is very important to perceive *Tampur I* hydropower development from the overall picture of renewable energy production and realise that *Tampur I* hydropower is not merely

focus of energy sector, but requiring supports from and co-operation with other relevant policy domains.

The involvement of multi-sectoral policies in *Tampur I* hydropower is shown by several permit requirements are issued by different ministries with different focus of interest. These permits and bureaucracy process have to fulfilled by *Kamirzu* to start the construction of *Tampur I* hydropower. Previously, section 5.1 has concluded that the large involvement of a large number of key stakeholders becomes the most influential factor to either speed up or block the development process of *Tampur I* hydropower. These key stakeholders who mostly represent central governmental bodies. This means those key stakeholders have the power and authority to make, amend, and/or omit the national policies and regulations which are relevant to influence *Tampur I* hydropower development. In practice, it may influence the length of bureaucracy process to complete *Tampur I* hydropower project.

This section briefly analyses and discusses the interlinkages between the selected relevant policies influencing the implementation process of *Tampur I* hydropower development in practice. The actor-based analysis is conducted to identify how and to what extent the set of policies from different domains influence the actions and strategies taken by the stakeholders with regards to *Tampur I* hydropower development in the level of implementation. Several relevant policy domains (forestry, water management, environmental protection, and energy production) with *Tampur I* hydropower development process have been selected and analysed from internal, temporal, and external perspectives. The interviewed actors have given actor-based policy coherence analysis from different interest, position and level of power. The different actors at the same organization or group of stakeholder provided a different picture of *Tampur I* hydropower especially in terms of policy implementation, including monitoring mechanism and integrated coordination among ministries in practice. There are two points of concern that will be briefly discussed in this section, which consist of (1) lack of external policy coherence among forestry, environmental, and energy policy domains, and (2) poorly implemented policy instruments among policy domains

It is common to find policies that can effectively solve a specific problem and achieve the objectives, but showing redundancies, mismatching and obstructing with other policy domains (Cejudo and Michel, 2017). This is because of the complexity of the interaction of multiple or multi-sectoral policies (Huttunen, 2015). One important point regarding the relevant policies influencing *Tampur I* hydropower lies on the mismatches between policy goal and the instruments from different domains. As the results, the existing policy instruments do not fit

with the practice of implementation in the case of *Tampur I* hydropower development to achieve government's target.

The incoherence between internal and external policy regarding *Tampur I* hydropower lies on the mismatches between policy goals and instruments from different policy domains. The first cause of the incoherence of implemented policy instruments in the case of *Tampur I* hydropower is because of the lack of coordination and co-operation among the involved key stakeholders, for example, MEMR, MOEF, MOPW, and PLN. Poor co-operation and communication occur from the level of administration, policy and regulation-making to the implementation process. By involving more stakeholders and in the policy formulation process, the policy will be more realistic and effective in the implementation level (Sen, 2008). Secondly, the incoherence between policy goal and instruments occurs because the instruments set by different domains targeting different focus of interest and objectives (Huttunen et al., 2014) with regards to the development process of *Tampur I* hydropower.

In general, forest policy instruments and energy policy goals are coherent. It is proven by the main objective of forestry policy instruments that is to preserve and protect the forest areal in terms of forest management and utilization. All selected relevant policy instruments regulate the utilization of forest areal for non-forestry interests, including renewable energy development and power plant installation in Indonesia. The point of coherence emerges on the general support from forestry policy instruments to fit with the energy policy goal, which is to develop and diffuse the renewable energy power plant across the regions in Indonesia like *Tampur I* hydropower project. The forest policy instrument set by MOEF to make a specific instrument regarding forest utilization and permit for non-forestry interests which is loan-use permit. It shows that forest policy instruments support the energy policy goal to develop and accelerate renewable energy power plant in Indonesia as what national energy target (KEN and RUPTL) mandate.

Yet, from the empirical analysis, the main policy incoherence in the case of *Tampur I* hydropower dominantly occur mainly in the forestry, environment and energy domains. First, the incoherence between (1) forestry policy goal and energy policy instruments, the incoherence between (2) environmental protection policy instruments and energy policy goal. First, incoherence between forest policy goal and policy instruments of the energy production sector. Comparing two policy goals between forestry and energy, both have different focus and targets. Despite the policy instruments from forestry sector provide support to the forest utilization for hydropower installation, but the other way around some policy instruments from the energy

sector is not fitted to the general forestry policy goal. There is no particular article in the selected energy policy instruments which emphasizes the social externalities for forest protection and compensation for affected local communities. A second issue is the internal and external incoherence between environment and energy domains. Indonesian government set a national energy target through developing renewable energy power plant like *Tampur I* hydropower. The goal of energy policy, in general, is to decrease the fossil fuels dependency of people in rural areas by exploring the potential local natural resources. The development of *Tampur I* hydropower is estimated to contribute to environmental and social impact. Yet, the environmental policy instruments do not complement the energy policy goals in terms of the social externalities due to private hydropower like *Tampur I* hydropower project. The incompatibility occurs between policy instruments and goals from forestry, environment, and energy sector.

The two points of incoherence in three policy domains result in the poor and ineffective policy implementation in *Tampur I* hydropower development process. The policy goals from those three policy domains particularly are in place to support *Tampur I* hydropower development. Yet, the policy instruments do not facilitate to achieve the energy policy goals in developing renewable energy power plant like *Tampur I* hydropower, therefore the implementation process of *Tampur I* hydropower has obstacles especially in terms of permit bureaucracy and monitoring processes. The incoherence of external policy in the three main policy domains is obviously observable in the implementation level of *Tampur I* hydropower development. The results of external policy incoherence in *Tampur I* hydropower supports the finding of Nilsson et al. (2012) and Huttunen et al. (2014) that inefficient policy implementation is influenced by unsupportive policy instruments and practices in the other sectors. In practice, the implementation cannot achieve the initial purpose of *Tampur I* hydropower set by the central government. The different interpretation of the policy goal from and policy directive at the different level of stakeholders especially grass root organizations also create the inefficient implementation process and the way of different level of stakeholders to define the urgency of *Tampur I* hydropower. This is supported by the finding of Howlett and Del Rio (2015) which stated that a number of different levels of government have a different number of goals since the policy-making process is set on the structural based by the top government (Peter, 2015). According to stakeholder analysis (see Section 7.1), the role of governmental bodies as key stakeholders and policy-makers is vital to the development process of *Tampur I* hydropower. Therefore, policies set by MEMR, MOEF, MOPW and PLN have direct influence on the

implementation process of *Tampur I* hydropower. One of the governmental policy goal to increase the economic growth and prosperity in rural areas is not reflected properly in the implementation level. May et al. (2005) found that policies are defined as coherent if, in the implementation level, the practices are properly and correctly implemented. Huttunen et al. (2014) also stated that one of the components of policy coherence is effective implementation of policy goals into practice. In turn, some selected relevant policy instruments in three domains regarding *Tampur I* hydropower are lack of coherence and not properly implemented according to the written regulation which results in long time bureaucracy of *Tampur I* hydropower process.

In general, the inconsistency of temporal policy is most observable in the energy policy domain. The energy policy instruments with regards to renewable energy development and power purchase agreement had been amended by MEMR twice in 2017. The temporally renewable energy shifting creates the unpredictability and uncertainty of the renewable energy investor entering Indonesia. In turn, the number of renewable energy investment contributes to the acceleration of national energy target set by government to reach 23 percent of renewable energy utilization by 2025. Temporal energy policy shift generates the top-down impacts, in particular *Kamirzu* as the developer of *Tampur I* hydropower. For example, the conflict management between IPP and local community, business unit's responsibility with regards to environmental permit process, and the implementation of BOOT scheme. Yet, in the level of bottom-up implementation, the local communities are not hit directly by the impact of temporally energy policy changing.

7.3 Disfunction of policies and regulations and the influence on relevant system functions

Three system functions assessed in *Tampur I* hydropower using actor-based analysis from different level of involved stakeholders. Poor implementation of policy instruments leads to negative transition effects (Huttunen et al., 2014) of *Tampur I* hydropower in three different system functions, which are knowledge development, direct search, and legitimacy. There are three main points of effects due to the malfunction of implemented policy instruments in the case of *Tampur I* hydropower in three different system, they are (1) poor knowledge and information exchange among levels of stakeholders, (2) ambiguous social acceptance toward the development of *Tampur I* hydropower. During the data collection of study literature, I found that *Tampur I* hydropower is already officially in the national energy governmental agenda, which means the market is already opened and existed for IPP to access and enter. Within this

situation, the TIS approach I adopt in this study is focusing on those three relevant functions and omitting other functions.

Those negative transition effects lead to inhibit in triggering the involved stakeholders, especially in the regional and local level to support and develop *Tampur I* hydropower. Since we have defined and the identified transition effect of *Tampur I* hydropower in (see Chapter 6) in three system functions, possible interactions are possibly occurring (Hekkert et al., 2007). Subsequent analysis step is by analysing the functional pattern (Bergek et al., 2008) to identify the interactions of effects among the system functions and know which effects affect the overall performance of process positively or negatively. Table below (see Table 11) shows the overview of the system functions operationalisation in the case of *Tampur I* hydropower.

Table 11. Operationalisation of system function in Tampur I hydropower project (Adopted from Negro and Hekkert, 2008)

System function	Event category
Guidance on the search	Positive general policy goals and targets
	Negative implementation of policy instruments (external incoherence)
Knowledge diffusion	Lack of workshop and seminar for local stakeholders
	Lack of collaboration meeting
	Lack of standard of operation
Legitimacy	Lack of integration among multi-sectoral permit requirement
	Social tension from grassroots

7.3.1 Identified triggering and hampering effects in "guidance on search" function

Guidance on search is a very important system function in the overall performance (Negro and Hekkert, 2008). Following the empirical finding of Bergek et al. (2008) that the starting point of development is often begun with a limited number of functions and eventually draws the other functions. That empirical finding prevails to the case of *Tampur I* hydropower development process where the first common trigger or starting point is in the system of guidance of the search. The "guidance of search" system function identified the central governments' concern and visions to develop and diffuse the development of renewable energy development across regions in Indonesia based on the local capacity. Indonesian government's ambition to increase the innovation and transition of renewable energy power plant is not merely centralised for MEMR as the national governmental energy body, also appealed for other relevant institutions. For instance, the policy instrument from forestry sector regarding

the loan-use permit for power plant installation, energy electricity supply, and renewable energy development. From the energy domain, MEMR created a national energy board to set national energy target, monitor, and evaluation the implementation process. PLN established a specific division to focus on the development of renewable energy power plant in Indonesia. In the regional level, the governor and head of *Gayo Lues* regency also had issued the principle permit to give the access and allow *Kamirzu* start the *Tampur I* hydropower project within their region.

The positive and negative effects are recognized by specific events categorized in the system function "guidance of the search". Those events comprise long-term positive policy targets set by governments from all selected relevant domains and negative policy implementation in forestry, environment, and energy domains. As discussed in Chapter 5 that the general policy goals from all domains are supporting each other to complete *Tampur I* hydropower development. Yet, the implementation of policy instruments from selected relevant domains, especially forestry, environment, and energy domains is lack of coherence which hampers the practices. The incoherence of implemented policy instruments particularly regarding the internalisation of externalities, also monitoring and evaluation mechanism made the regional government and grassroots were in uncertain risks due to the development process of *Tampur I* hydropower. Temporally inconsistent policy shifting also made investors like *Kamirzu* was in unpredictable bureaucracy permit process of *Tampur I* hydropower development. Rapid shift and unclear standard of operations among governmental bodies had influential unsupportive effects to the implementation process of *Tampur I* hydropower. In this case, the effects on the function of Guidance of the Search is influenced through policy targets set by the government according to Haase et al. (2013) found in his research. The unclear regulations and mechanism with regards to monitoring and evaluation of *Tampur I* hydropower are considered as the negative effect on the function of Guidance of the Search. This supports the theory built by Hekkert et al. (2007) that the function of Guidance of the Search refers to the long-term goals, expectations, and strategies set by the government. The on-going debates about the benefit of *Tampur I* hydropower local people get, occur between state, especially in regional government and non-state actors (*Harimau Pining*) can hamper the development process of *Tampur I* hydropower. That supports the finding of Hekkert et al. (2007) that discussion about the potential benefit of new technology is likely to hamper the future development.

In conclusion, I can deduce that in the case of *Tampur I* hydropower, the "guidance on search" system function importantly can influence the overall system functions to the

development process of *Tampur I* hydropower. This is strengthened by Hekkert et al. (2007) in the finding that guidance of the search is the important function from the societal stance. The weak governmental policy targets and goals to support the implementation process of *Tampur I* hydropower is regarded as the weakness of this function. The unclear regulations regarding the monitoring and evaluations hampered the flow of knowledge transfer and diffusion hampered. Regulations regarding "who monitors who, who monitors what" are not clearly specified and structured in the policy instruments from all domains. Regulations are not integrated with each other, so the effects are also applied and spread to knowledge diffusion and legitimacy system functions also. This supports what Jacobsson and Bergek (2011) stated that a weakness in the function of Guidance of the Search has much to do with the form of institutional weakness. The weak regulations lead to different interpretation of what matters and urgency of *Tampur I* hydropower development in *Gayo Lues* regency from the perspectives of stakeholders in regional and local level. As a result, the development of *Tampur I* hydropower is not legitimate and beneficial for local stakeholders.

7.3.2 Poor knowledge and information transfer (top-down to bottom up)

This function normally defines how well performance of local TIS in terms of knowledge base and captures how knowledge is transferred and diffused in the system (Bergek et al., 2008). As the types of knowledge has been discussed in Chapter 6, this section focuses on the relation or interaction among system functions, either "knowledge diffusion" affects to other functions or "knowledge diffusion is affected" by other functions in *Tampur I* hydropower development.

Specific events are identified in this system function. Following the measurement by Negro and Hekkert (2008) and Bergek et al. (2008), the events consist of workshops and collaboration meetings with stakeholders in *Tampur I* hydropower. Previously in section 7.3.1, the influence of triggering and hampering effects of *Tampur I* hydropower development have been discussed and analysed. There, the government has made set of positive regulation with regards to renewable energy development like *Tampur I* hydropower. The clear set of goals, targets, and actions leads to the implementation process by transferring and diffusing the knowledge and information among the involved stakeholders of *Tampur I* hydropower in different level (see motor B in Fig.16).

Research and development regarding *Tampur I* hydropower has been conducted by *Kamirzu*. Thereby, the knowledge creation is not taken into account within the analysis. Yet,

Tampur I hydropower is mandated from the top or central government under MEMR and executed by PLN to make a business and deal with *Kamirzu*. This way pushes central government to announce the development plan of *Tampur I* hydropower and transfer the information and knowledge to the lower level of governmental and non-governmental organizations. The knowledge transfer is regarding the hydropower utilization, local management, and progress information of *Tampur I* hydropower from central government to regional government and eventually delivered to a representative of the local community. In 'knowledge diffusion' function, the top-down knowledge and information transfer lead to lack of knowledge and information exchange in the implementation process of *Tampur I* hydropower. As a result, the interest of grassroots is poorly facilitated. The information and knowledge flow tends to be more in 'top-down transfer' than 'knowledge sharing or exchange' which means the indigenous customs, culture, tradition, and habit are not highly in direct participation in the decision-making and implementation process. The knowledge diffusion function of *Tampur I* hydropower is not in line with the finding of Oberthür (2009) and Stokke (2009) which observed that the role of knowledge and capacity building influence the politics of environmental governance in practice. If private hydropower monitoring and evaluation are clearly regulated and promoted by policy instruments and regulations in "guidance on search" function (see Section 7.3.1), all sectors in other system functions will also be covered in terms of knowledge diffusion and transfer. This result supports the finding of Huttunen et al. (2014), who also found that the attention to promote biogas production in policies and regulations will be followed by other sectors in other system functions.

In conclusion, in the context of knowledge diffusion of *Tampur I* hydropower, the urgency of the development of *Tampur I* hydropower set by governmental policy goals can be strengthened in the form of bottom-up knowledge transfer. *Tampur I* hydropower development can be well promoted if knowledge and information transfer is not centralised from the top government to bottom stakeholders. This way means the importance of knowledge sharing, in the forms of workshop, seminar, and collaboration meeting is very important to trigger the development of *Tampur I* hydropower in the rural area like *Gayo Lues* regency. Within knowledge sharing, the national renewable the energy target set by government can be understood obviously by the involved local stakeholders of *Tampur I* hydropower, in particular, regional governments, grassroots, and the local community of *Gayo Lues*.

7.3.3 Compliance with social tension

The location of *Tampur I* hydropower makes the development process involving the local stakeholders, in particular grassroots or local environmental NGOs. That condition requires the social acceptance and compliance with every relevant stakeholders and institution. The condition of how *Tampur I* hydropower can be accepted and complied with relevant stakeholders especially the influenced actors like local community is the component of making *Tampur I* hydropower legitimate to develop. The implementation process of *Tampur I* hydropower can be hampered if the society resists changing. Having a legitimacy can help to trigger and smooth the implementation process of *Tampur I* hydropower. Moreover, the key stakeholders mostly take participation in the implementation process of *Tampur I* hydropower.

Previous chapter (see Chapter 6) had shown that there are several permit requirements and processes that are obliged to be fulfilled before the construction process started. The permits processes are required by different governmental institutions with different schemes. The scheme shows that the permit processes from one ministry to others are integrated and connected yet to each other. The permit reports from different institutions depend on each other. Yet, the implementation process to issue the permit from is not integrated yet. As a result, the bureaucracy permit processes, such as loan-use and construction permit take time for starting the implementation process of *Tampur I* hydropower (see Fig.15). Figure above shows the permits processes involved in *Tampur I* hydropower. The solid lines show the permit requirements and processes within the PLN system which also directly connect to MOEF and regional governments' authority. The long dash-dot lines show the permits issued by head of regional governments which becomes one of the requirements of loan-use permit proposed to MOEF. The long dash dot-dot shows the permit process under the authority of regional government. The dash lines show the intertwined permit requirements and processes from different institutions, which means if one permit is not issued from one sector institution, another permit from another institutions can't be issued. For example, they show that in order for *Kamirzu* to do an environmental assessment, beforehand the feasibility study has to be fulfilled. Once the result of the environmental assessment permit has been issued, it has to be handed to Governor of Aceh. Unintegrated permit processes schemes between governmental institution lead to the ineffective implementation of permits processes. Linking to guidance on the search function, lack of standardized monitoring and evaluation mechanism leads to poor monitoring and evaluation implementation, including permit processes. As a result, local

stakeholders especially *Gayo Lues* government and *Harimau Pining* were not updated with the development progress of *Tampur I* hydropower, such as environmental permit assessment.

Poor collaboration meeting among stakeholders (knowledge diffusion function) leads to the lack of an integrated standardized mechanism of permits and monitoring & evaluation that should be clearly set by the governments (see motor C in Fig.16). As the result, lacking standard of operations emerge as the negative effect which decreases the legitimacy of *Tampur I* hydropower and potentially creates the social tenses or conflict because of not having mutual understanding. This supports the finding of Negro and Hekkert (2008) that legitimacy system function has triggering functioning system if there is an alignment between institutions and the needs of the emerging innovation system.

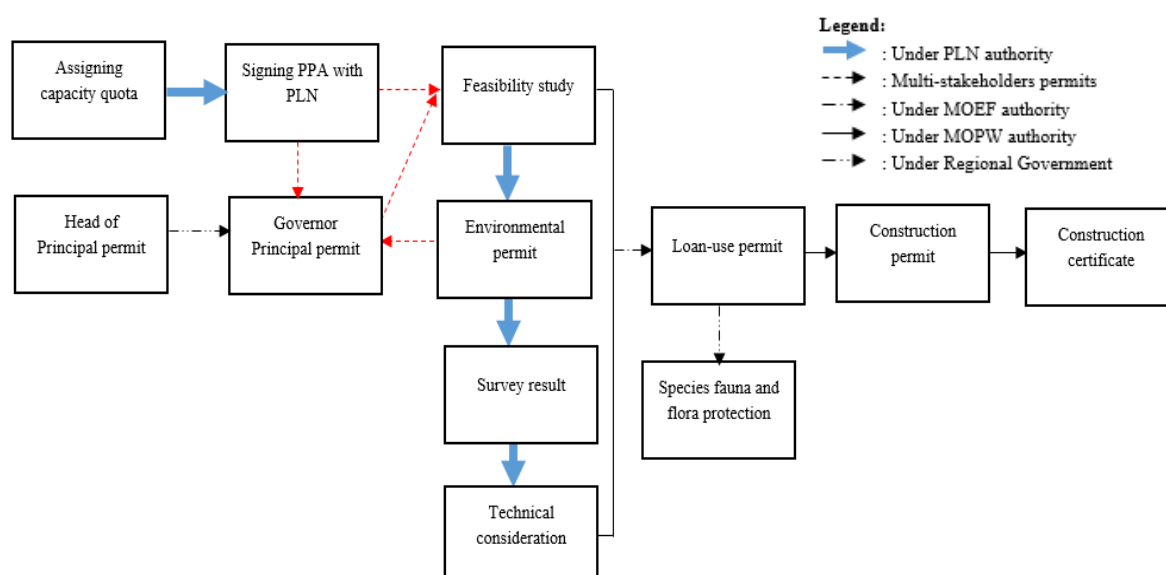


Figure 16. Permits processes within the implementation process of *Tampur I* hydropower

To summarize, the development of *Tampur I* hydropower, including the implementation of policy goals and instruments set by the government, also the knowledge and information diffusion can't be effective if *Tampur I* hydropower do not comply with involved stakeholders with different interests and positions. The result of this section found that the system function of legitimacy can help in triggering *Tampur I* hydropower development and achieve the expected outcomes. Also, minimizing the social tense occurred during the development process of *Tampur I* hydropower due to the high participation of a large number of key stakeholders.

7.3.4 Functional interactions in the implementation process of *Tampur I* hydropower

The previous section has described the transition effects of *Tampur I* hydropower in each different system functions. The negative effects emerge in all three different system functions, especially in terms of knowledge diffusion and legitimacy functions. This section shows the interaction between system functions if TIS function works well or not in the case of *Tampur I* hydropower development, as functions affect or influence each other in the system (Hekkert et al., 2007).

Tampur I hydropower in *Gayo Lues* regency is a large hydropower project which is developed to produce and supply energy electricity from renewable energy resources (water river). The main initiator is the private foreign investor, *Kamirzu*, that had signed the capacity quota and PPA with PLN to take *Tampur I* hydropower responsibility. The construction plan of *Tampur I* hydropower was started and mandated in national energy plan (RUPTL 2017 and 2018) and strengthened in *Permen ESDM* No. 50 and 49/2017. This act guides the direction of search (see motor A in Fig.16) towards the renewable energy power plant development. As mandated by MEMR to achieve 23 percent renewable energy of total energy mixes, the other governmental ministries support with the policy instruments regulating renewable energy development like hydropower to be developed across regions in Indonesia. Across relevant ministries and institutions recognize the development of renewable energy, including *Tampur I* hydropower development as it is mandated legally in RUPTL 2017 and 2018 which has to be the national guideline of renewable energy development programs.

After getting recognized by across ministries in top government level, *Tampur I* hydropower is introduced and promoted to the provincial and regency governments as the regional representatives. Top government under PLN start to generate and diffuse the information and knowledge regarding *Tampur I* hydropower to provincial government (see monitor B in Fig.17). The status of *Tampur I* hydropower as a private project restrains the functions and actions of MEMR and PLN to have a direct involvement in the construction process of *Tampur I* hydropower. The knowledge diffusion tends to be top-down implemented from central to provincial government. Information and knowledge regarding the progress, use, benefits, and losses of *Tampur I* hydropower is also diffused to lower level stakeholders with few numbers or workshops, seminars, and collaboration meetings which made insufficient information and knowledge delivered to local and grassroots organizations.

The knowledge diffusion and exchange can be in more positive interaction if the society in *Gayo Lues* accepts and complies with the energy transition project like *Tampur I* hydropower. The knowledge and information diffusion require society to be both informant and receiver. Thereby, this also leads to the social acceptance and compliance of all stakeholders especially local stakeholders like communities and local environmental NGOs. Lack of positive effects on the knowledge diffusion leads to the weak legitimacy of *Tampur I* hydropower (see motor C in Fig.17). This situation requires stricter and more integrated policy instruments and implementations (external and temporal coherence). Here, the interaction between legitimation and guidance of direct search is intertwined and turn around back within the cycle. The result of this study is different from Hekkert et al. (2007) which depicted possible multiple functions interactions and multiple starts in the field of sustainable technologies. In the case of *Tampur I* hydropower development, there is a single interaction between functions which function of guidance of search positions (e.g. national energy target and priority in 2025) as the start. This is because this study covers merely one specific case study of renewable energy development in Indonesia which is *Tampur I* hydropower, there is single functions interaction emerges as in the figure below depicts. Yet some findings, such as Huttunen et al. (2014) omitted one function of development of positive externalities and combined a function of knowledge development and diffusion as one set of functions. A few of TIS function may have more influence in the process than the others with different obstacles (Haase et al. (2013). For instance, in the case of first biodiesel generations, the guidance of search and market formation may be the biggest drivers, meanwhile, for the biodiesel case which has been commercially produced, market formation relatively plays a minor role in the process.

Tampur I hydropower is already developed by *Kamirzu* which is why the knowledge diffusion and legitimacy play more influential role in the development process than guidance of the search. The other functions do not emerge in the development process of *Tampur I* hydropower project. As Haase et al. (2013) also showed the algal biofuel case which presented five functions in the development process. Three primary functions influencing the development process of *Tampur I* hydropower asserts the notes from Haase et al. (2013) that all functions are important, yet some functions are not as influential as others.

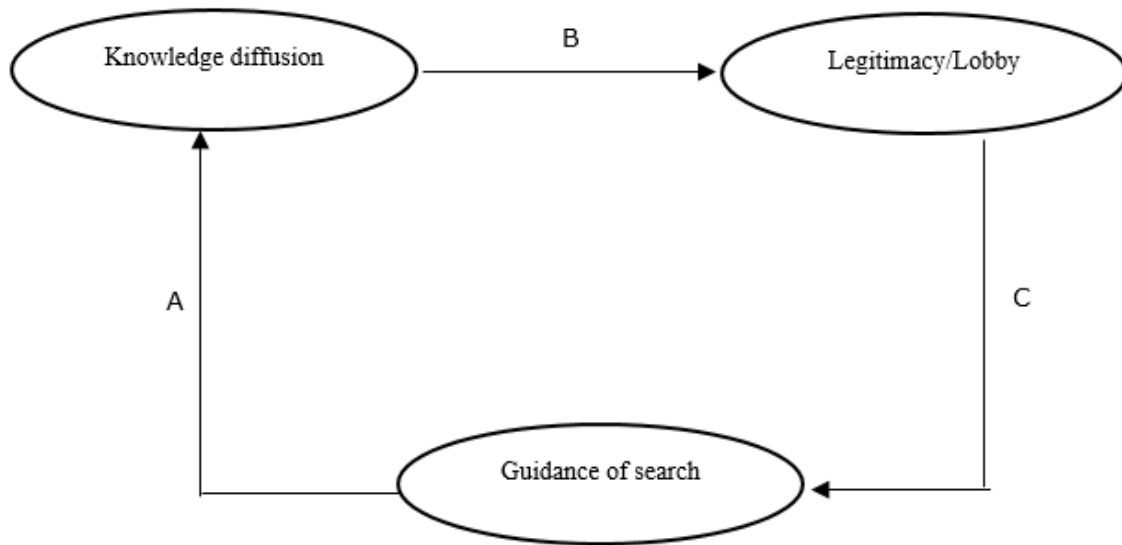


Figure 17. Functional interactions of Tampur I hydropower

To conclude, the interaction of system functions leads to hampering or slower down the development process of *Tampur I* hydropower project. This is because the case shows negative interactions mostly occur between relevant system functions and strongly interplay with each other. This supports the findings of Negro and Hekkert (2008) that negative interaction between system functions can hamper the implementation process of technology transition and innovation. The interplay of a set of clear guidance by the government, top-down knowledge and information diffusion and social acceptance and compliance may influence to hamper the implementation process of *Tampur I* hydropower and make the social tense resistant to the transition renewable energy project. Supporting policy goals and a number of workshops and meetings are ineffective if the society and grassroots movements can't accept *Tampur I* hydropower and comply with the renewable energy transition in their region, *Gayo Lues*. The less participation of *Harimau Pining* and other local environmental NGOs in the collaboration meeting becomes the social issue that has to be handled and dealt with by *Kamirzu* and PLN. The result of this paper supports the finding of Haase et al. (2013) that some of TIS functions are not as influential as others, but still important. It is shown from the case of *Tampur I* hydropower development case which proves legitimacy, and social acceptance play a more dominant role influencing guidance on search and knowledge diffusion in *Tampur I* hydropower system and contributing to another future renewable energy technology development in that area. Despite the knowledge diffusion is difficult to measure empirically (Negro and Hekkert, 2008), but the case of *Tampur I* hydropower supports the finding of Negro and Hekkert (2008) also that much more knowledge diffusion takes place between stakeholders

and implements in bottom-up line (Huttunen et al., 2014), higher diffusion and improvement created. Thereby, the impact of *Tampur I* hydropower is higher allocated in the legitimacy function, compared to the other functions.

7.4 Validity and Reliability

There are two important concepts that researchers have to understand to highlight the conceptual relationship, which are validity and reliability (Drost, 2012). As this thesis is categorized as qualitative research which I measure the phenomena in context-specific setting, I found many challenges during the data collection. Hence, it is important to measure the validity, either internal or external, as well as the reliability of this thesis research. This section discusses the validity and reliability of this research to show how challenges and bottleneck of applying methods of collecting data in this research influences the results of this study.

7.4.1 Internal Validity

In terms of maximizing the internal validity of this research, this study has used the concept of triangulation of methods and sources in the data collection. At first, this study has made some scope of research and assumptions based on the literature of policy documents before the data collection. Since there are the number of ministries in Indonesia intersecting with energy issue, I listed and assumed several central ministries that relate to and involve in *Tampur I* hydropower development with the scope of the interviewee. During the data collection, To ensure the validity of interview results, the scope of interviewee is limited to a person who is in the strategic position in the related institution, for instance, head or vice head of an organization. This is because this research focuses on the analysis of policy documents which requires people who have deep understanding regarding the background, progress, and implementation of policy in the selected sector.

Yet, although the scope of the respondent has been made before data collection, this study still found the challenge in the interview stage. The first obstacle of this study's interview is finding the right respondent because of the large and wide structure of a ministry. Also, the insecurity of the respondent candidate becomes the second obstacle in the data collection which makes it delayed for a while. For several interviews, I did not ask for permission to the interview to record since for some respondents, especially the local community, the issue of *Tampur I* is sensitive for them. For example, there are two divisions in MOPW which deal with the issue of renewable energy development within forest areal with different functions and coverages (1) within the area of protected forest; (2) within the area of conservation forest. At the first time

of interviews, I was transferred from one institution to other institutions and from one person to other persons, as some people I was about to interview argued that they were not in the right positions to share the information openly. In this situation, the snowball method is the right way I have to use to find the right institution and respondent to be interviewed until the saturation point. Once the name of respondents has been found, I contacted and made the appointment for an exact day.

Another scope of interview is the length of the interview. When contacting the respondents, I firstly told them the length of the interview would be to ensure the availability of the respondent and the focus of the interview process. Other challenges during the interviews were about the making of the appointments. Despite making an appointment since days before, the cancellation of the interview frequently occurred. During the interview, some interviewees were distracted because the respondents who are in the important positions of organization were busy and had a lot of meeting. The interviewee tended to explain in short and in a rush which made the questions needed to be repeated to collect the right and complete answers. This situation actually had been prevented by the researcher, yet the external factors in the realisation process were unpredictable.

Another methods to ensure that the research measures what it has to measure, this study conducted several sources of literature before confirming to the expert interview to find out the right institutions or stakeholders involved in the implementation process of *Tampur I* hydropower. Several methods have also been used during pre- and interview process, for instance, literature study on relevant policy documents, journals, news articles, reports, and the findings of the interviewees. Conducting multiple methods and sources can assist the researcher to answer the research questions in the qualitative study more valid and reliable (Golafshani, 2003). In sum, the triangulation of sources and methods above has aimed to increase the internal validity of this research.

7.4.2 External Validity

Besides internal, external validity is also important to discuss to test if the result of this study can be generalized in other settings of other research. This study conducted stakeholders interview and analysis which are based on the qualitative criteria. That is why it is necessary to increase the external validity of this study since it is difficult to generalize the stakeholders' criteria qualitatively. Mitchell et al. (1997) pointed out that there is not exact definition to determine the entity of an actual stakeholder. There is also no universal claim to narrow the

range and attribute of stakeholders in stakeholder analysis (Mitchell et al., 1997). Moreover, Crosby (1992) also mentioned that stakeholders analysis is not a single tool which consists of a number of different methodologies, for example, context of analysis and the identification methods (Brugha and Varvasovszky, 2000). As this study involves the number of different stakeholders, mainly legislators, such as government agencies, this research adopted stakeholders analysis method by Mitchell et al. (1997) by analysing the interest and power level as the context in which the analysis is carried out. The context of the position of stakeholders is also included, since there is a potential debate on *Tampur I* hydropower development among the involved stakeholders.

As well as, this study focuses also on policy documents which require the perspectives of legislators in analysing the policy implementation. Therefore, it means that the result of this research can be applied to other research settings under the similar conditions, which involve multiple key stakeholders and sectoral policies like the case study of this research. The TIS framework of this study also adopted from several methodologies such as Huttunen et al. (2014) which determined certain functions according to the context of the case study. The users of the result of this research should be careful in adopting this study since this research might be different with the previous study. It is because the scope of this research is smaller and more specific to only one renewable energy project in one specific regional area, which needs further development.

7.4.3 Reliability

Reliability can be defined as a stability, which consists of stable measure and a similar result if the research is conducted for the second time (Golafshani, 2003). The reliability of this study lies in the case study and literature study methods to ensure the accuracy and consistency of the research over time. To minimize the issue of reliability, this study has stored and saved the collected data and information, in particular the recording interviewees and transcript of the interview. Hence, if this study would be conducted for the second time for further research development, it would derive the same result and conclusion in the same case study and interviewees.

8. Conclusion and Recommendation

8.1 Conclusion

Renewable energy development and the transition have become an important sector for Indonesia government's concern in order to secure national energy security and enhance the economic development. This concern is articulated in the renewable energy power plant development set by the government or private investor (IPP). *Tampur I* hydropower is one of private large hydropower project set by the foreign IPP with government's approval. Multi-sectoral stakeholders involve in the development process of *Tampur I* hydropower. Within the development process, central governmental institutions mostly take part which are categorized as key stakeholders due to with the high level of power and legitimacy. Yet, the large participation of key stakeholders is poorly integrated into *Tampur I* hydropower development process. That condition results in the delay of the development process in terms of permit assessment processes. Despite *Tampur I* hydropower is categorized as private large hydropower project, the intensive roles and high interests of key stakeholders play important role in the development process of *Tampur I* hydropower.

Stakeholder analysis approach in this research helped in identifying to what extent the roles, strategies, and positions of key stakeholders influence the development process of *Tampur I* hydropower. By stakeholder analysis, this research came up with the first important point of conclusion. First, the high commitment and interest of relevant top governmental institutions still play the most important roles in accelerating, not only public but also private renewable energy power plant projects in Indonesia, even though in the rural area like *Tampur I* hydropower. Within stakeholder analysis, this research provided insight into how key stakeholders' interest is related to the level of supports they possess towards the implementation process of *Tampur I* hydropower development. Grassroots organizations, such as local environmental NGOs had less participation and taken into account by regional governments. If grassroots are provided more spaces to involve and be considered during the development process of *Tampur I* hydropower, they can provide aims to develop and increase the legitimacy of *Tampur I* hydropower project from the perspectives of local people, either strong or weak support it depends on the legitimacy of local NGOs in *Gayo Lues*.

Second conclusion, I find areas of incoherence in addition to three main selected relevant domains (energy, forestry, and environment) with regards to *Tampur I* hydropower development process. Large participation of key stakeholders from different sectors in *Tampur*

I hydropower development leads to policy incoherence between policy goals and implementation level that mainly occur in forestry, environment, and energy domains. By combining stakeholders analysis and policy coherence, this research provides an empirical finding that the level of influence and interest of key stakeholders influences the implementation of policy instruments in practice. The poor and ineffective implemented policy instruments then affect the development process of *Tampur I* hydropower, either if it triggers or hampers the implementation process. The analysis of *Tampur I* hydropower development using TIS function also demonstrates how poorly integration of involved key stakeholders in which are central governmental institutions leads to external policy incoherence in different system functions. The TIS function helped this study to identify the extent to which the policy incoherence from selected relevant domains caused negative transition impacts that hamper to trigger the development process of *Tampur I* hydropower.

Third point of conclusion, the case of *Tampur I* hydropower development demonstrates that supporting general policy goals from selected relevant domains are insufficient to push and accelerate renewable energy power plant in Indonesia. Most importantly, the policy incoherence is driven by the poor integration of key stakeholders in the level of implementation. From the perspectives of involved stakeholders, legitimacy acts as a source of negative interaction between functions which slows down the development process of *Tampur I* hydropower. Moreover, poor policy implementation of one domain may result in clashes with implementation in other domains. In the case of *Tampur I* hydropower, it occurs on the permit process of one domain that is intertwined with other domains. Yet, in terms of the implementation, the scheme of permit processes are not clearly integrated from the perspectives of policy instrument and implementation.

In sum, the coherence and synergy between policy instruments and the implementation from one domain to other domains will have triggering effects in achieving the implementation process of *Tampur I* hydropower. Here, the role of powerful key stakeholders is necessary to ensure that policy instruments and regulations with regards to renewable energy development are implemented coherently in practice and line with the goals of other relevant policy domains, in particular, goal of the energy sector. Therefore, a set of clear and integrated scheme of the permit process, monitoring and evaluation need to established to enhance the integration between key stakeholders. As well as, the involvement of grassroots and bottom-up knowledge diffusion process need to improve in order to achieve mutual understanding among all stakeholders and meet the renewable energy national target.

8.2 Recommendation

This section points out some recommendations with respect to the result of this research and for further research. The points of recommendations are made objectively according to empirical observation and the analysis result of this research. There are two points of recommendation I address with regards to the renewable energy development and transition in Indonesia in general and *Tampur I* hydropower particularly to the authorized institutions and involved stakeholders.

First is achieving mutual understanding among all involved stakeholders in the development of *Tampur I* hydropower. The adoption and adaptation of policy system should follow more bottom-up approach in order to provide the impetus, effectiveness, and content for national policy strategy. Hence, the national energy policy and target can be socially accepted and reduced the disparity in the level of policy implementation. In terms of knowledge diffusion perspective, all involved stakeholders have to be aware of the driving force and the importance of *Tampur I* hydropower development built in *Gayo Lues* regency, in particular, the local stakeholders. Mutual understanding can be achieved by putting aside the negative assumptions from certain stakeholders through making a transparent flow of communication and the strong network will all key stakeholders. As private hydropower project, from the beginning, *Tampur I* hydropower tends to bring up speculations from local stakeholders. Therefore, bottom-up knowledge exchange and diffusion process are needed to improve the involvement of grassroots organizations in *Gayo Lues*. So, the source of knowledge and information is not centralised from central government to regional government to local people. By taking into account indigenous culture, custom, and regulations within the development of *Tampur I* hydropower, they will do for the sake of their region's development. For example, conducting a public hearing for a few times, starting communication with the local stakeholders before the project implementation process started. By doing it, grassroots organizations will have more spaces to speak up their point of view, get knowledge and updated progress information regarding *Tampur I* hydropower development. So that, the expectation of stakeholders can be well managed and the social tense happening during the development process of *Tampur I* hydropower can be minimized.

Second point of recommendation is clear and integrated policy implementation mechanism. Through this written mechanism, the problem of 'who does what' could be solved clearly. This will lead to increase multi-sectoral coordination and participatory of local actors,

also minimize the potential conflict between different level of government due to misunderstanding the workflow in the field. According to my observation and stakeholders in-depth interview, each governmental institution does not have a clear written scheme of monitoring and evaluation. If then they have standardized monitoring and evaluation process, the scheme does not integrate and connect them with each other. The unclear task of 'who to do what' within and between institutions leads to less functioning the role of certain relevant institution, such as Directorate General of New and Renewable Energy in the development of renewable energy in Indonesia. The presence of divisions in an institution cannot be effective if there is no clear schemes or standard of operations to articulate task division for each directorate.

By creating a formal scheme of monitoring and evaluation, an institution can keep tracking how the development progress of a project in other institution, why the permit is not eligible to issue yet, what the bottleneck of issuing the permit in one institution, and others. So that, every schemes of each institution can be integrated and not clashed in the implementation level. Making standard of operations of monitoring and evaluation and integrating between ministries by conducting regular collaboration meeting to discuss the project. Within this, every involved stakeholder are aware of the different schemes from different ministries that are relevant to renewable energy development. Arranging and managing regular collaborative meeting between key stakeholders to inform policymakers from different relevant sectors regarding what current progress, bottleneck, and unanticipated consequences may occur in the short and long-term period. Policy-makers will also know what underlying mechanism or regulation from one institution that is not coherent with other domains in the implementation level, so they can make the structural and formal mechanism of monitoring and evaluation to avoid the misconception and incoherent implementation.

Last but not least, it is necessary to conduct further research on the competence and politics of policy. To understand and pursue public policies in dealing with climate change issue, further research regarding the competence and integrity of public policy bodies is important (Jacobsson and Bergek, 2011). This study has shown that the renewable energy development and transition in Indonesia involve the large number of top governmental bodies with policy-making authority. Following that situation, the coordination of policy intervention from all relevant domains is required to make sure every involved stakeholders' expectation shaped (Jacobsson and Bergek, 2011). Also, it is crucial for researching further on the use of TIS framework in specific sustainable technology in one particular area. As the past research

mostly took place in the large-scope renewable energy development in the level of the country, for example, Haase et al. (2013) with the case of Solar PV development in US and Hekkert et al. (2007) with the case of biofuels application in the Netherlands. Through this research, I expect further research on the validity of the TIS framework in the small-scope or sustainable technology development in the regional level but influenced by the national policies and regulations.

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APPENDICES

APPENDIX I : Semi-structured questions for Interview

POINTS OF SEMI-STRUCTURED QUESTIONS:

General question about the interviewees

- Name
- Institution
- Occupation/Position
- Educational background

A. POLICY COHERENCE

1. Stakeholders analysis

- What is your organization's role in the development of *Tampur I* hydropower?
- What is your organization's vision in the development of *Tampur I* hydropower?
- What is your organization's strategies or actions in the development of *Tampur I* hydropower?

1. Land procurement for hydropower *Tampur I*

- What are policy instruments that are issued by your organization or institution which are relevant to land acquisition and use for renewable energy project in Indonesia (*Tampur I* hydropower case)?
- What are the goals of the policy that are issued by your organization or institution in terms of land acquisition and use for renewable energy project?
- What are the actions that are being or have been executing in the level of that policy implementation?

2. Forest damage from building hydropower *Tampur I*

- What are policy instruments that are issued by your organization or institution which are relevant to land acquisition and use for renewable energy project in Indonesia (*Tampur I* hydropower case)?
- What are the goals of the policy that are issued by your organization or institution in terms of land acquisition and use for renewable energy project?
- What are the actions that are being or have been executing in the level of that policy implementation?

3. Energy production

- What are the policy instruments that are issued by your organization to deal with the land allocation for the development of hydropower *Tampur I* in Aceh?
- What are the policy goals that are issued to the land allocation for the development of hydropower *Tampur I* Aceh?
- What are the actions that are being or have been executing in the level of that policy implementation?

B. TECHNOLOGICAL INNOVATION SYSTEM

1. Knowledge development and diffusion

The breadth and depth of the formal, research-based knowledge base and how that knowledge is developed, diffused and combined in the system.

- How many collaborative meeting are conducted for the development of *Tampur I* hydropower in a year?
- How many socialization of that are conducted in before the development of *Tampur I* hydropower built in a year?

2. Guidance of Search

a. Vision and Mission of Organization

- What is the vision and mission of your organization?
- Is energy included as your priority in your organization's vision?

If yes, proceed to the next questions:

- What are targets that your organization would like to achieve?
- How to achieve?
- What are actions already conducted and the upcoming action plans?
- What are the obstacles to achieve the vision and energy target by your organization?

3. Legitimation

Social acceptance and the socio-political process of legitimacy formation through actions by various organizations and individuals.

a. Permit requirements and process

- Are your organization legitimate to issue a permit?
- *If yes*, what kind of permits are issued?
- How is the mechanism of issuing permit?
- Has the permit been issued?
- What are the obstacles of issuing the permit?

b. Public participation

- Are there any discussions or public hearing held with regards to the development of *Tampur I* hydropower? (before and during the project)
- How was the discussion?
- How many discussions are held already?
- Who were invited to the discussions?
- How many local people from *Lesten* were invited to attend the discussion?
- What were the materials or topic of discussions delivered in the discussion?
- Are there any updates of information and progress of the development of *Tampur I* hydropower?
- How were the cooperation between central and regional government?
- How many collaboration meetings have been done?

APPENDIX II: The identified policy coherence issues with regard to *Tampur I* hydropower

	Internal	Temporal	External
Forest management	<p>+ Policy instruments and goals push for hydropower installation for electricity within the forest area</p> <p>- The implementation of regulations may not specifically consider the social externalities like compensations and/or incentives for influenced local people and wild animals protection due to hydropower building by the private.</p> <p>- The policy goals and implementation of forest management may not be in line each other in hydropower development for electricity supply to people in forest areal, hence the purpose of hydropower building for society is not reached properly.</p>	<p>+ Consistent policies and regulations of forest management push the development of hydropower</p>	<p>- Poor Standard of Operations (SOP) or clear mechanism related to each sectors, and co-operation between different sectors or ministries which create the incoherent implementation.</p> <p>- Poor supporting and suitable regulations of economic instruments for local people, such as incentives/compensation for private power plant project with policy goals and instruments of other sectors.</p> <p>-Lack of exchanging knowledge and progress or updates of existing project between sectors and level of government (central, province, and regent level).</p> <p>-The implementation of BOOT mechanism for hydropower installation by private investors may not be supporting each other with another permits from another sectors.</p> <p>- Incoherent policy implementations in the field with policy goals and instruments.</p> <p>+ Coherent general policy goals between forest, water management, environmental permit, and energy production.</p> <p>+ Support for renewable energy transition sector from all domains of policies.</p>
Water management	<p>+ Policy goals and regulations push dam building and assure the safety aspects</p>	<p>- Regulations related hydropower project by private</p>	

		and PLN may not significantly considered in the policy instruments
	- No particular articles to govern water sources utilization for energy power plan (hydropower) installation by private.	
Environmental permit	<p>+ The environmental permit goals and regulations push the promotion of hydropower development</p> <p>- There are no particular aims or instruments to govern the environmental economic instruments to society due to hydropower building by private.</p> <p>- Opened rights of society to protest may hamper the bureaucracy process due to political interests for hydropower developers or investors.</p>	<p>-Environmental permit documents issued by the central and/or provincial government may have not been in line with the real implementation in the field; less participation of local actors.</p> <p>- The unpredictable and uncertain due dates of permit assessment process between in the regulations and in the field; uncertainty for the investors and local actors</p>
Energy production	<p>+ Policy instrument and goals push the promotion of hydropower development</p> <p>- Direct selection mechanism and BOOT may give limited access and hamper investors to get the funding.</p>	<p>- The regulations related to the power purchasing agreement (PPA) with investors have had some changes and given uncertainty to renewable energy investment climate</p> <p>- The policy instruments and goals may not meet the needs and participation of local actors</p>

in the implementation of
hydropower building

- The implementation of monitoring and evaluation of private hydropower building may not be governed in a clear mechanism or Standard of Operations.
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APPENDIX III: Identified transition impacts of internal, temporal, and external policy coherence from stakeholders' perspectives in Tampur I hydropower development

System function		Forest management and protection	Water management for hydropower	Environmental permits for hydropower	Hydropower for electricity energy supply
Knowledge diffusion through networks	Internal Temporal External	Support for the development of hydropower from all policy domains (+), Poorly exchanging knowledge, information, and co-operation between different sectoral ministries and officials both in central, regional government, and local people level (-)			
Influence on the direct search	Internal	In general policy goals and regulations are supporting the development of renewable energy (e.g. Hydropower) as one of the non-forestry activity within the forest areal (+)	Supportive policy goals and regulations for the safety of dam, but regulations contain governance of water source utilization for private hydropower project discourage (+/-)	Supportive policy goals for renewable energy development permits in general, but open public protest may be influencing the environmental permit results in practice (+/-)	Supportive and positive policy instruments and targets push the hydropower development as one of renewable energy producer (+)
	Temporal	Temporally consistent policy and regulations for increasing the investors entry to develop hydropower in forest areal. (+)	Consistency on policy and regulations for promoting the water sources utilization, but not particularly elaborating hydropower development (+/-)	The implementation of uncertain and unpredictable changes in time period of environmental permits documents assessment process in the practice may hamper the construction period (-)	Changing or inconsistency of principles of power purchasing agreement (PPA) may cause the uncertainty for future investment (-)
	External	Generally coherent policy goals from all domains for renewable energy transition (+), Incoherent poor policy implementations between domains create incoherent unsupportive policy goals in other domains (-),			
Legitimation	Internal	Discouragement of specific regulations social externalities due to private hydropower		General policy goals and environmental permits may have increased the legitimacy to push hydropower building (+)	General policy goals and instruments may increase the legitimacy of

	project discourage may decrease the social acceptance of hydropower development for local stakeholders (-)	hydropower development, but BOOT tariff and direct mechanism create ambiguous policy implementations for the investors (+/-) Changing PPA regulations (-)
Temporal		
External	Coherent policy goals may have increased the legitimacy of hydropower development (+), Incoherent policy implementation may have decreased the legitimacy for promoting hydropower development (-)	