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Integrated Management of Biomass Energy in Thailand

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Abstract

Biomass energy is expected to be one of the future main renewable energy in Thailand when considering their potentiality and raw material from the agriculture and the agriculture industry sectors. However, the increase of biomass power plant in Thailand is unable to contribute the progress of biomass energy technology because of the lack of the integrated management for both supply chain management and social management including the supporting information system. Therefore, the objective of this paper is to analyze the issue of biomass energy technology in Thailand; subsequently proposing the integrated management model of biomass energy technology in Thailand with the supporting information system. The model of the management attempts to establish the technology flow process of biomass energy addressing the technical issues, human resource management and environmental and social acceptance by building 3 new specific units; the biomass national center (BNC), the biomass training center (BTC) and the biomass information center (BIC).In addition, the biomass information system for the administration of the biomass information center consists of 2 functional parts based on the client and server theory. The server is divided into 2 levels, the external server as the government and the internal server as the biomass information center (the main server) connected with the supply chain management and the social management. The client is divided into 3 sectors, the farmer, the vendor and the community.

Keywords: Energy, Biomass, Information System

1 Introduction

Biomass energy resource has absolutely a great deal of potentiality in Thailand but also be significant challenge to be the future main energy. Although the ministry of energy improves the alternative energy development plan (AEDP 2012 -2021) from the previous plan from 5,600 MW into 9,200 MW, when approached on the biomass ratio, the biomass target is set to slightly decrease from 3,700 MW to 3,630 MW (Department of Alternative Energy and Efficiency, 2012). It can be concluded from literature reviews for the unexpected progress of biomass energy in Thailand such as the barrier of the biomass technology transfer (Assanee and Boonwan, 2011), the social unacceptance of the environmental management (Assanee and Trirat, 2010), the failure of the information system management and the inconsistency of supply chain management (Energy Policy and Planning Office, 2010). Under such circumstance, the integrated management of biomass energy technology in Thailand is required for achieving the goal of the maturity technology.

As has been shown, the paper firstly is to criticize the difficulty with the embodiment of biomass technology management in Thailand and then the paper is to propose the integrated management model of biomass energy technology in Thailand with the supporting information system.

2 Literature Review

In order to establish the model of the integrated management for the biomass technology management, various issues of Thai biomass energy have to be strongly examined. The biomass issues can be divided into 2 main categories; the supply chain management and the social management (Assanee and Trirat, 2010 and Assanee and Boonwan, 2011).

The supply chain management is mainly focused on the interaction between the farmer and the vendor under the intervention of the government. The issues of the supply chain management can be summarized as upstream, midstream and downstream issues represented as follows:

The upstream issues are the lack of information of biomass cultivation. In detail, the biomass plants depend on several factors such as the cultivation area zone, the price mechanism, the natural disaster and the seasoning agriculture. The co-organization of these several vital factors is necessary to establish the up to date integrated management information. Thus, the biomass forecast and planning for the farmers is always failure as shown previously in the case of thr long term regression of palm's price from 2009 – present (Energy Policy and Planning Office, 2010).

The midstream issues are the shortage of channel and communication between the farmers and the vendor. The types of biomass raw material are varied by topography surrounding the power plants. Furthermore, the biomass crops are selected from the local cultivations because of saving transportation cost. Consequently, the effective information linkage between farmer and vendor for a specific supply – demand in different areas is required. Furthermore, the biomass technology is apparent in the midstream issues. The status of biomass technology was criticized by Assanee and Boonwan (2011) as only the first state of maturity resulting from the expensive cost per fuel unit, which is far away from the comparative market fuels. Besides the good policy campaign, the government must contribute the information center of the practical research and development and the effective human resource management. Finally, the information of the financial support and condition for small power producers from the fund institutions must be easily access by the vendor (Energy for Environment Foundation, 2010). The investment information is vitally requiremented as the conditions from the financial institution, the condition of licence permission from the energy regulatory commission including other investment cooperation informations as one stop service.

The downstream issues are the inconsistence of the fuel price mechanism and the government intervention. The regular case issues in Thailand is the adversely overlapping role of the government as the heavily price subsidy of fossil fuel for lower cost of living conversion with the poor and uncertain biomass promotion campaign. Under such circumstance, the vendors lack the faith in the information of biomass promotion campaign to follow the biomass strategies (National Health Commission Office of Thailand, 2012).

The social management is mainly focused on the interaction between the vendor and the community by the co-operation of the government. The primary contradiction is the different view between the community and the vendor or the producer. In fact, the power plant establishment has to gain the complete agreement between the vendors and the locals in public space before getting the license permission with social contract. However, the participation by the locals for the power plant establishment tends to a narrow and specific group setting up of the vendors. As a result, the public hearing fail to be openly accessed by the whole locals. (Assanee and Trirat, 2010). Consequently, the information of the public hearing including the procedure and the operation results is essential to be freely available and accuracy for the community.

In summary, in order to cross the barriers of undeveloped biomass energy technology in Thailand, the integrated management of biomass energy has to be exist.

3 Theory and Methodlogy

The paper applies 2 main theoretical concepts, technology transfer for the integrated management model of biomass energy technology and the client and server for the biomass information model.

Firstly, Technology transfer can be defined as "a process by which expertise or knowledge related to some aspect of technology is passed from one user to another for the purpose of economic gain" (Schnepp et al., 1990). The technological content of international technology transfer is represented in Figure 1 (Shujing et al., 2012).

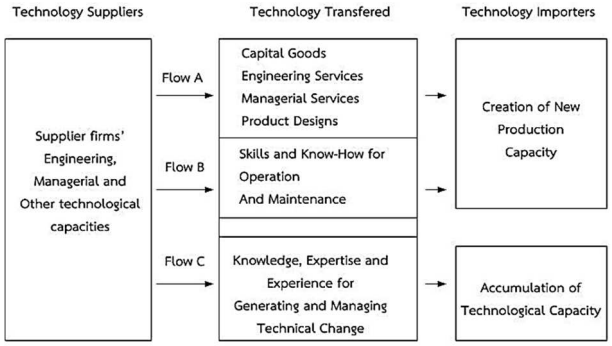

Figure 1 The technology content of international technology transfer (Shujing et al., 2012).

Technology transfer process can be described by the integrated of the framework of the technology transfer (Speser, 2006) and the communication theory (Berlo, 1960) as

Technology donor plays a role as a sender.

Technology plays a role as a message.

Transmission method plays a role as a channel.

Transmission recipient plays a role as a receiver.

In addition, the model of technology transfer process can be evaluated as shown in Figure 2.

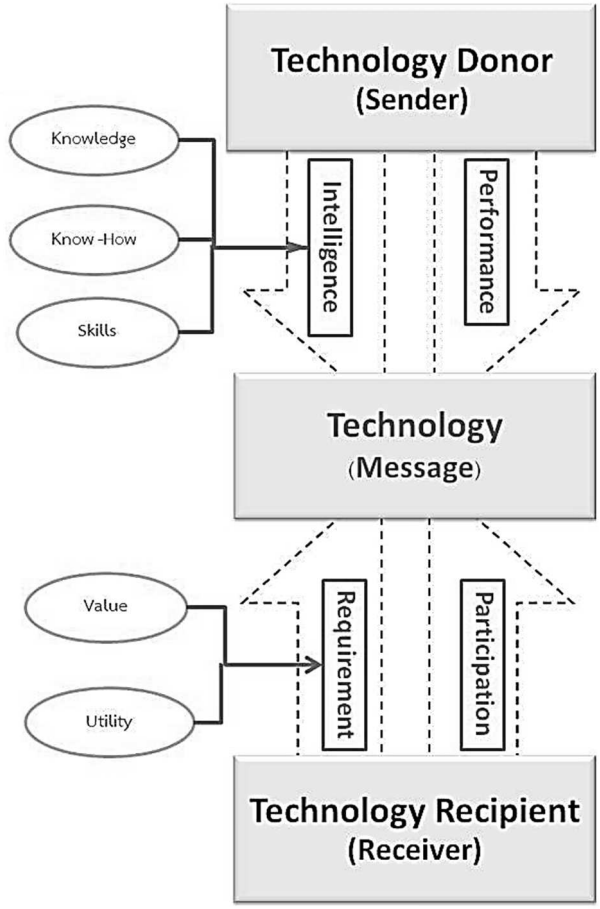

Figure 2 The model of technology transfer process.

In fact, the major barrier of technology transfer process can be identified to be a mismatch donor and recipient cultures as a result of the specific embodied in the technologies (Aasen et al.,1990). Consequently, in order to achieve sustainable transfer diffusion, the transfer system with sophisticated technical training and the acceptance of recipient's society without any issues on the adaptation is an essential requirement. By evaluating the comprehensive knowledge of technology transfer, the biomass technology in Thailand can be developed as a new system for technology transfers towards a sustainable development.

In addition, the framework of the client and server theory is applied for building the biomass information model. In detail, the different function parts of the client and server theory by applying to the biomass information model can be demonstrated as follows:

Main server as the main network will receive the information from sub – server for the evaluation of the selected data, data filtration and resulting data delivery to the sub network in the system.

Main server can be divided into 2 categories:

Internal server as the server inside of the organization system is under the working system management or control; in the case study of biomass information model as biomass information center, social management and supply chain management.

External server as the server outside of the organization system is the disability of the working management or control; in the case study of biomass information model as government.

Sub sever as the sub network connected with the main server perform to delivery data from the main server to distribute into the network of the clients in the network system of the sub server and receive the information from the clients network to delivery it into the main server for the examination of the reaction or the data processing.

Sub server in the research can be divided into 3 network systems, whole of them are the sub servers of supply chain management;

Up stream connected with the client sever of the farmer

Mid stream connected with the client sever of the vendor

Down stream connected with the client sever of the vendor

Client as the inside network, possibly being in the main server or the sub server performs to request the data and service from the server.

Client in the research can be divided into 3 categories; farmer, vendor and community.

4 Results and Discussion

The barrier of the overview energy technology transfer in Thailand is the social unacceptance due to the suspicion of negative externality and the lack of the public participation for the civil inspection of environmental impact assessment (Assanee and Trirat, 2010 and National Health Commission Office of Thailand, 2012). It can be concluded from Assanee and Boonwan (2011), the barriers of the maturity technology for the biomass energy in Thailand are the technical skill and knowledge. Under such circumstance, the implementation of biomass energy technology transfer has to be the integrated management by the openly participation from whole sectors. Consequently, the term of the integrated management for the biomass technology transfer is embedded in the various functions as below;

- Policy making and planning
- Formulation and implementation programming
- Information and public relation coordinating
- Research and development supporting
- Technology developing and commercializing
- Demonstration, pilot projects and extension programming
- Intellectual property and innovation promoting
- Fiscal and financial incentives provisioning
- Human resource developing and training
- Environment and society acceptance managing

Under such circumstances, these issuses can be solved by the proposing model of technology transfer process under the applied framework of technology transfer (Figure 2). The proposing model to overcome the barriers of the biomass issues in Thailand is represented as Figure 3.

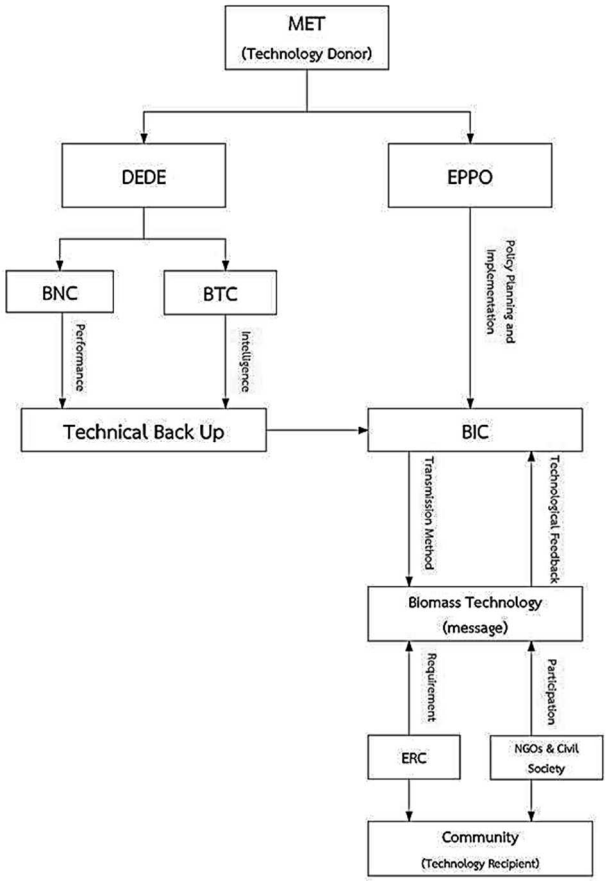

Figure 3 Biomass energy technology transfer.

As illustrated in Figure 3, in order to reach the goal of technology transfer, the model proposes to build the 3 new units for the direct responsibility of the specific functions. Firstly, the biomass national center (BNC) is to take the responsibilities of research and development support, intellectual property and innovation promotion and demonstration, pilot project and commercializing. Secondly, the biomass training center (BTC) is to take the responsibilities of human resource developing and training. The two units are under the authority of the department of alternative energy development and efficiency (DEDE). In addition, the biomass information center (BIC) under the authority of the energy policy and planning office (EPPO) is to take the responsibilities of information and public relation coordinating including formulation and implementation programming, fiscal and financial incentives provisioning and environment and society acceptance managing.

The overview of biomass energy technology transfer is to start up with the ministry of energy, Thailand (MET) as the main technology donor, which drive the biomass energy technology transfer via of the department of

alternative energy development and efficiency (DEDE) for technical back up and the energy policy and planning office (EPPO) for policy planning and implementation. In addition, biomass technology is the message sent by biomass information center (BIC). The biomass technology is inspected by the requirement of the energy regulatory commission (ERC) and the participation of NGOs and the civil society.

The biomass information system based on the client – server theory for the integrated management of biomass energy technology is represented the various different functional parts as follows. The server of biomass information model is illustrated as Figure 4.

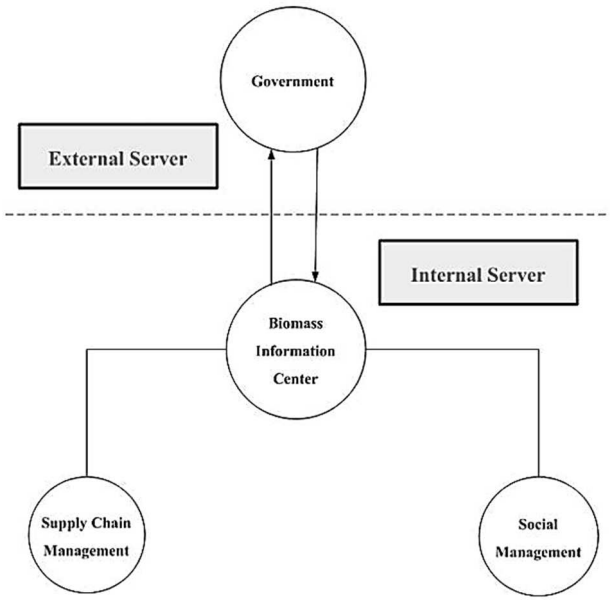

Figure 4 The server of biomass information model.

According to figure 4, the server is divided into 2 parts, the external server and the internal server with 2 sub servers. The external sever is taken responsibility by the government. In addition, the main internal server is under control by the biomass information center, collecting the datas of 2 sub internal servers dividing by 2 functional parts; supply chain management and social management and coordinating these datas with the government via the external server.

In addition, the 2 sub internal servers can be given more details by the subsequent figures and contents. The supply chain management connected with 2 clients, the farmer and the vendor is demonstrated as Figure 5.

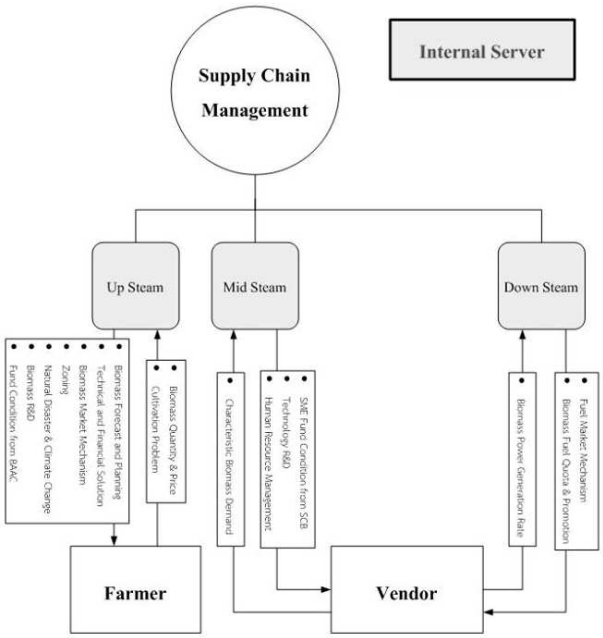

Figure 5 The supply chain management.

The funtionality of supply chain management, by dividing into 3 parts, up stream, mid stream and up stream, can be concluded as follows;

Up stream deliveries information into the farmer as biomass forecast and planning, technical and financial solution, biomass market mechanism, biomass zoning, natural disaster and climate change, biomass research and development and fund condition from Bank for Agriculture and Agricultural Co – operatives (BAAC) and receives data from the farmer as biomass production rate and sell rate and cultivation problem.

Mid stream deliveries information into the vendor as Funds condition from the fund institutions, technological research and development and human resource management and receives data from the vendor as the characteristic and quantity of biomass demand.

Down stream deliveries information into the vendor as fuel price marketing mechanism and biomass fuel quota and promotion and receives data from the vendor as the biomass technology production rate and problems.

Finally, the social management connected with another 2 cilients, the vendor and the community, is shown in Figure 6.

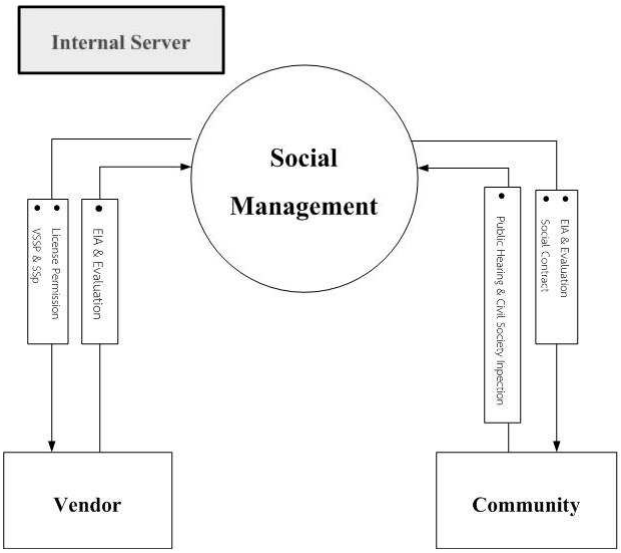

Figure 6 The social management.

As illustrated in Figure 6, the social management is the linkage between 2 clients; the vendor and the community. The social management not only delivers information into the vendor as license permission and inspection procedure, but also receives information from the vendor as environmental impact assessment (EIA). In addition, the social management delivery the information of environmental impact assessment (EIA) and social contract into the community and receives the information of public hearing civil society inspection from the community.

In summary, the information linkage between the farmer and the vendor is the supply chain management and the information linkage between the vendor and the community is social management.

5 Conclusion

The integrated management of biomass energy technology is to address the technical issues, human resource management and environmental and social acceptance by building 3 new specific units; the biomass national center (BNC), the biomass training center (BTC) and the biomass information center (BIC). Subsequently, the model of technology transfer process is applied for the completion of technology flow of biomass energy technology transfer. In summary, the research paper is to implement biomass technology in Thailand by the application of technology transfer model. For more detail, the biomass technology transfer model proposes the effective message in 3 suitability areas with 2 specific categories as social suitability with the urbanization, the shared ownership participation, the economic suitability with the employment opportunity expansion with the technology and human resource development and the clarified environmental impact assessment with openly participated inspection. In addition, the biomass information system is the integrated administration of dynamic information system enabling the essential information linkage with the relevance people or group of the biomass in Thailand to be highly effective connection. In addition, the server of the biomass information model based on the client and server theory can be described as 2 functional parts: the first part is the server, divided into 2 categories; external server as the government and internal server as the biomass information center (the main server), the supply chain management and the social management and the second part is the client, divided into 3 categories, the farmer, the vendor and the community.

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