ASSESSING MICRO AND SMALL BUSINESS' ENERGY MANAGEMENT TO OPTIMIZE MICRO AND SMALL BUSINESS' PRODUCTION: CASE STUDY

MENGEVALUASI MANAJEMEN ENERGI DARI BISNIS MIKRO DAN KECIL UNTUK MENGOPTIMASI PRODUKSI DARI BISNIS MIKRO DAN KECIL: STUDI KASUS

by

Maria K. Mawati[1]
Paulus Kindangen[2]
Hizkia Tasik[3]

[123]Faculty of Economics and Business, International Business Administration, Management Program
Sam Ratulangi University

E-mail:
[1]kimberlymawati@yahoo.com
[2]kindangen_p@yahoo.co.id
[3]hizkiatasik1@gmail.com

Abstract: Energy is used in the production process as the inputs. Micro and small business have big role in the economic growths. This micro and small business' use the energy as an input. This study aims to describe the current energy management. The informants are the owner of micro and small business and the household. Using a qualitative method with case study approach this study found that energy that act as input in the production process could affect the production input. The energy needs are different for each micro and small business. Cheaper energy could reduce the energy spending for the micro and small business home activity, but not for their production activity. Energy spending of the micro and small business does have significance effect to the micro and small business production output. Cheaper energy does reduce the energy cost in number but it does not increase the production output in long-term. They are currently not saving the energy and only a few have intention to save in future. Micro and small business need to use renewable energy in their home activities, the cost could be considered high, but in long term it is cheaper and more environmental friendly.

Keywords*: energy availability, energy management, micro and small business, bitung*

Abstrak: *Energi dipergunakan dalam proses produksi sebagai inputs. Bisnis mikro dan kecil memiliki peran yang besar dalam pertumbuhan ekonomi, dan mereka menggunakan energi sebagai inputs. Studi ini bertujuan untuk mendeskripsikan manajemen energi yang sekarang ini dilakukan. Informant di studi ini adalah pemilik bisnis mikro dan kecil, dan anggota keluarga, untuk mendeskripsikan manajemen energy di aktivitas produksi dan manajemen energi di rumah. Dengan menggunakan metode kualitative dan pendekatan studi kasus, studi ini menemukan bahwa energi yang digunakan sebagai input ini dapat mempengaruhi tingkat produksi, Energi yang dibutuhkan di kegiatan produksi berbeda dengan kegiatan rumah, energi terbarukan dapat mengurangi pengeluaran untuk kegiatan rumah dari bisnis mikro dan kecil, tapi tidak untuk kegiatan produksi. Pengeluaran untuk energi memiliki dampak terhadap output produksi. Dengan harga yang lebih murah bisnis mikro dan kecil dapat menghemat, tapi tidak dapat meningkatkan produksi dalam jangka panjang. Bisnis mikro dan kecil tidak melakukan penghematan energy dan sedikit yang memiliki niat untuk menghemat di masa yang akan datang. Studi ini menyarankan kepada bisnis mikro dan kecil untuk menggunakan energy terbarukan dalam aktivitas rumah tangga dan mengurangi pemakaian energy untuk aktivitas rumah tangga.*

Kata Kunci: *ketersediaan energi, manajemen energi, bisnis mikro dan kecil, bitung*

INTRODUCTION

Research Background

Energy is commonly found in our daily life and has an important influence on economics activity since the availability of energy would impact the society ESDM (2016). Energy availability is important for the daily life like cooking and as power for the appliances on the houses. It also has major role in the production activities, since energy would act as the gear to the production process. It could affect the economic activities as well. Mujiyanto, and Tiess (2013) predicted that the energy consumption rate would rise to threefold from 2010 to 2030.

Operation management transforms inputs to output. As an input in the production process energy has major role, the household that doing Micro and small business need to be able to manage it, the resources needed to produce products and service for the household (Slack., Chambers and Johnston 2010). Micro and small business would need energy in their production activity, each sector would need different size of energy depends on the output they would need to produce in need to meet the demands. Indonesia household energy consumption rate are increasing (yoy), while the consumption rate is increasing the production rate is decreasing ESDM (2016) and BP (2017). Mujiyanto and Tiess (2013) predicted that the non-renewable energy supply wouldn't be able to meet the demand of energy. The high rate of energy consumption would deplete the energy reserve. Predicted with the current pace of energy demand, non-renewable energy supply would not be able to keep up.

With this limitation of energy availability, the micro and small businesses has still to be able to run their production. They could increase their production with more energy availabilities. More energy as the inputs mean more products could be produced. That means increase in the micro and small businesses production that would eventually lead to increase in the welfare of the household. Developing micro and small businesses could also absorb the unemployment in the region. Therefore the household should efficiently manage their energy consumption. Energy conservation would highly reduce the consumption and switching to renewable energy is more preferable.

With this limitation of energy availability, the micro and small business has still to be able to run their production. Therefore, the household should efficiently manage their energy consumption. Raaij and Verhallen (1983) argues that to know the consumption behavior we need to know about the energy usage pattern of the household. Energy conservation would highly reduce the consumption and switching to renewable energy is more preferable. Limited resources could end up in increasing expenses and eventually exiting the business. They could increase their production with a proper energy management. Allocate energy more into the production than idle activities. That means increase in the micro and small business production that would eventually lead to increase in the welfare of the household.

Research Objective

The objective of this research is to assess the energy management done by the micro and small business.

THEORETICAL REVIEW

Production

Production is defined as the utilization, resources transformed into a commodity. Resources are anything that acted as the input in the production process. Activities, work that has been done with all the resources used to produce something to be achieved. The provision of raw materials is one of the factors of input in production process, either for manufacturing business or service / service. The availability of raw materials cannot be controlled by the company and there can be constraints on the production process.

Energy Use Management

Resources in the production process should be manages effectively and efficiently. This aims to gain a profit or profit at a certain time. It is said to be effective if in the production activity is able to allocate the resources owned by the best. Efficiency is the result of comparison between physical output and physical input. The higher the ratio of output to the input, the higher the level of efficiency achieved. Achieving maximum output from the use of certain resources. If the resulting output is greater than the resources used then the higher the level of efficiency achieved.

Case Study

Case study commonly try to figure out the decisions made by the object of interest, why they choose that certain action and rather than other actions, how this certain action later be implement, then what is the outcome. Case study is not just a tool for data collection or data analyze, it is a comprehensive research strategy. Case study investigate empirical topic by following a set of prespecified procedures (Yin, 2014). The case study strategy is used since this research is focused on contemporary events. The question structured more focused in how the micro and small business manage their energy, from the beginning of the production process until the end. The questions are also focused on why does the micro and small business made their current decision regarding energy management and production. The case study method steps are divide into three major parts; first the define and design, have the cases selected and collection protocol designed, second the prepare collect and analyze, where the researcher conduct the case studies then write individual case report for every key informants, third is the analyze and conclude part, the researcher draw cross-case conclusion from each of the cases then find the link in between, modify the theory based on the findings, develop policy implication, and write cross-case report.

Decision Making

The decisions made by individuals are widely recognized as being affected by three sets of factors—decision features, situational factors, and individual differences. One of the decision making model is rational decision making. The rational model of decision making assumes that people will make choices that maximize benefits and minimize any costs. The idea of rational choice is easy to see in economic theory. For example, most people want to get the most useful products at the lowest price; because of this, they will judge the benefits of a certain object (for example, how useful is it or how attractive is it) compared to those of similar objects. They will then compare prices (or costs). In general, people will choose the object that provides the greatest reward at the lowest cost.

Attitudes and Motivation

The entrepreneur may not care to maximize, but may simply want to earn a return that he regards as satisfactory. However attitudes may change with price, price as a reference point. Business owner form a reference point for future judgments of the value of price offers based on current observations of resources prices. This implies that attitudes toward price offers vary with observed prices. Business owner attitudes and motivation in choosing the resources use in the production process is important. Different resources would produce different result, either by size or quality. Not just the size and quality, the resource used in the production process also determine the cost of production.

Previous Research

Djanibekov and Gaur (2018) in nexus of energy use, agricultural production, employment and incomes among rural households in Uttar Pradesh, India, found that the member of the household could affect the energy management process. "The energy use nexus the policy and technological changes affect the supply of and demand for commodities and employment structure of many households that in turn can impact the economy of the region."

Rahut et al (2014) in determinants of household energy use in Bhutan, also founds that household choice of cleaner energy is affected by the gender and other demographic factors such as; age, education, access to electricity, location and also level of income. Female-headed households are more likely to choose cleaner fuels, and that above all the availability of a clean and cost-effective source of energy within the proximity is and in during periods of low economic growth, traditional energy carriers are dominant. "Household income, approximated by per capita expenditure, indeed affects households' energy choices and movement towards cleaner fuels. Other factors that affect fuel choice are age, gender of the household head, educational level of the household head, location (rural or urban area), number of children, number of old household members, household size, and access to electricity. Richer households tend to use cleaner energy for lighting, cooking, and heating, indicating that with the rise in income and increase in accessibility to the energy markets, most Bhutanese households will switch to cleaner sources of energy."

Li et al (2015) in analysis of rural household energy consumption and renewable energy systems in Zhangziying town of Beijing, found that switching into renewable energy give the household higher production value at lower price. Proper energy management gives the household solution to energy shortage and also helps fossil resources conservation. The decisions made by individuals are widely recognized as being affected by

three sets of factors—decision features, situational factors, and individual differences. This decision made by the business owner in choosing the resources for the production process and managing the resources are important. Right and bad decisions have impacts to the production performance. "Renewable energy is not only a solution to the energy shortage problem in rural areas, but also helps conserve fossil resources and protect the environment."

Conceptual Framework

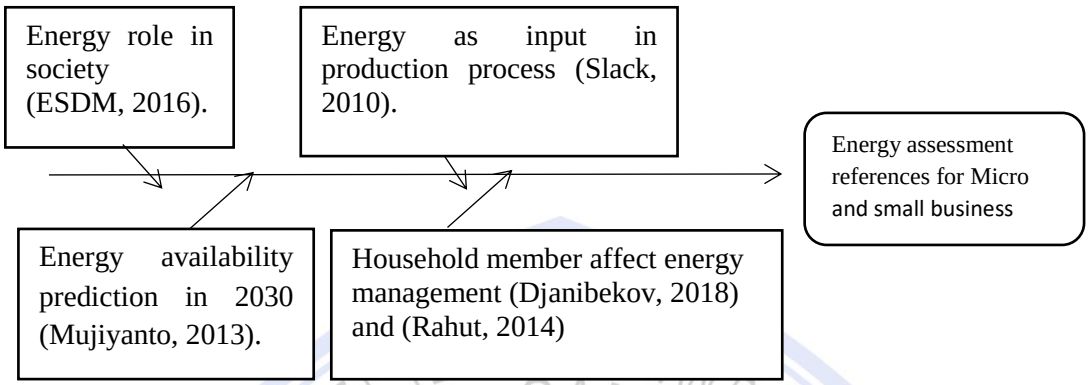

Figure 1. Conceptual Framework
Source: Data Processed, 2018

RESEARCH METHOD

Research Approach

This is a qualitative research and data are collected and analyze in case study approach. The data collected will be presented then adjusted by reducing the amount of the data, eliminate the excessive data. These two steps will be conducted several times to make sure the data is proper. After the steps, the data will be concluded and ready to be presented, if necessary the researcher could add more data again and back to evaluate those additional data.

Population, Sampling Technique, and Sample Size

The population of this research is the micro and small business in Bitung and the household members of the micro and small business. Purposive sampling method is applied for data collection. The informants in this research are the owner of micro and small business that depends on traditional way of production and the household member. Size of the sample is 10 business' owner and 10 household members that in charge of cooking. Originally the researcher plan to take sample from Manado, Bitung and North Minahasa. Targeting micro and small business produce ikan cakalang fufu. According to data from Bank Indonesia, those three regions have the same commodity, which is ikan cakalang tangkap. But from the pre-survey the researcher found that the Micro and small business in Manado in North Sulawesi were not produced the products but they got supplied from Micro and small business in Bitung. Running the survey in Bitung, the researcher got new information. That the number of Micro and small business doing ikan cakalang fufu production has decreased by approximately 50%. The causes are later discussed in the discussion section. To increase the number of samples, the researcher added other Micro and small business with the same characteristic.

Operational Definition of Research Variables

Table 1. Variable Definition

Variable	Definition	Indicator
Micro and small business Production	Production is defined as the utilization, resources transformed into a commodity. Resources are anything that acted as the input in the production process. Activities, work that has been done with all the resources used to produce something to be achieved.	- Raw material availability - Energy choice

Micro and small business Behavior	Implementation of economy to which business's owner or manager anticipate favorable or unfavorable outcome from the performance of such behavioral action.	- Production size - Income - Expenditures

Source : Author's Note, 2018

The main variables are the micro and small business productions, this production output could be affected by the inputs. Which are the raw materials availability, and energy is one of the input needed in production process. The behavior of micro and small business' owner in managing their production would affect the micro and small business' production. The business owner decision would affect the choice of raw material and energies, decisions are affected by several things, by the prices and the production output. From the output the business owner would later evaluate whether the inputs option are good enough or an adjustment would be needed.

RESULT AND DISCUSSION

Informants' Demographic

The Informant age varies from 21 to 79, most of them are adults on their 40s. 3 out of 10 of the main income earners are female. Vary from 4 to 9 are the number of people in the household. The Informant is included in the household member size. All of the Informants are located in Bitung, North Sulawesi, and have the business. Most of the Informant had ±9 years of formal education experience. Informant categorized into five group of formal education experience.

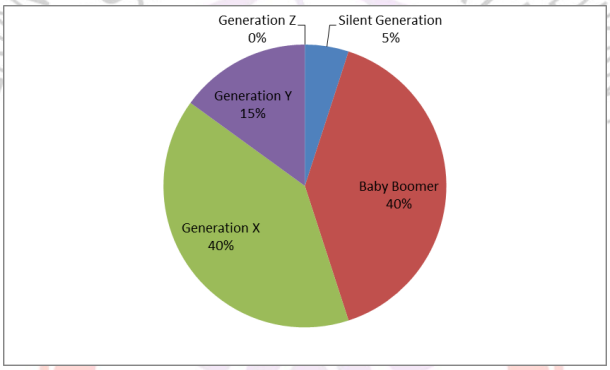

Figure 2. Age Distribution

Source: Data Processed, 2018

3 from generation Y (born between 1981 and 2000), 8 from X generation (born between 1965 and 1980), 8 from the Baby Boomers generation (born between 1946 and 1964), and 1 from the Silent Generation (born between 1927 and 1945). Most of the respondents are from the X generation and Baby Boomer.

Demographic and Production

Variety of age and educational background among the key informants doesn't significantly make a difference from each of their production. The size of their households however does make a difference for their energy usage. Big household found that it is hard for them to save energy from idle activities. While none of the key informants are saving energy at the moment, two of them are considering the idea of saving.

Table 2. Demographic, Production, and Expenses

Production Sales	Total Expenditure	Spending for Energy	Energy Choice Available	Age	Education	Size of Household
11.000.000	20.000.000	6.000.000	6	54	Not finish junior high school	6
9.000.000	5.000.000	2.000.000	5	40	Finish junior high school	7
8.000.000	5.000.000	2.000.000	6	79	Finish elementary school	9
8.000.000	4.000.000	2.000.000	3	64	Not finish junior high school	6
8.000.000	3.000.000	2.000.000	6	44	Finish university	6
10.000.000	20.000.000	7.000.000	4	36	Finish senior high school	7

9.000.000	3.000.000	2.000.000	4	44	Not finish senior high school	5
9.000.000	5.000.000	3.000.000	5	49	Finish senior high school	4
7.000.000	4.000.000	2.000.000	3	55	Not finish senior high school	4
7.000.000	4.000.000	2.000.000	4	52	Not finish senior high school	5

Source: Data Processed, 2018

The spending on energy are included their spending for the production and their energy spending for home activities. The production cost in the analysis is the cost for raw material, labor cost, inventory cost, and operational cost. Any cost used for the production in one month based.

Energy Assessment

None of the Informants have biomass, coal, steams, briquettes, hydro power or wind power in their households. All of the Informants have electricity and coconut material, one of them does not have LPG on their home. 6 out of 10 have firewood as their energy source substitute. While electricity could be categorized as renewable energy depends on its source.

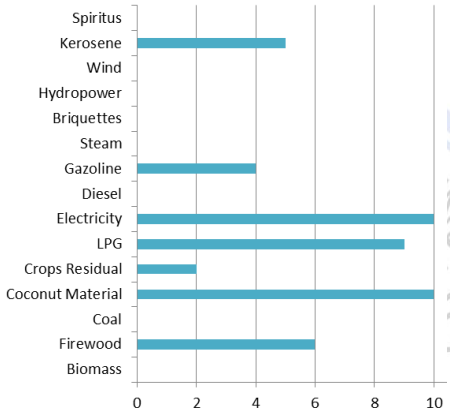

Figure 3. Energy Availability
Source: Data Processed, 2018

In total, the Informant most used energy is coconut material followed by electricity. The Micro and small business most frequent used energy by order is coconut material, and electricity. While the household member most frequent used energy by order are electricity, LPG, coconut material, and kerosene.

The energy used in household activity mostly to watch television, cook, and clean the house. Then they used the energy for lighting, charging devices, and fan or ac. Energy consumption in industry sector is decreasing and household energy consumption is increasing (ESDM, 2017). Micro and small business production activity the energy mostly used in the production process. For Micro and small business that doing fumigation, the coconut material is used in fumigation process, electricity mostly used for lighting since they have night shift and worked until dusk. The *Ikan Cakalang Fufu* Micro and small business mainly need two major inputs to be able to run their production. Those are the fish (*cakalang*) and the *gonofu* (coconut materials). The Micro and small business said that, since the regulation of Indonesia's Fishery Minister, the number of fishes they could get decrease and that make their production also decrease. Some Micro and small business exit because they couldn't make up to the production level.

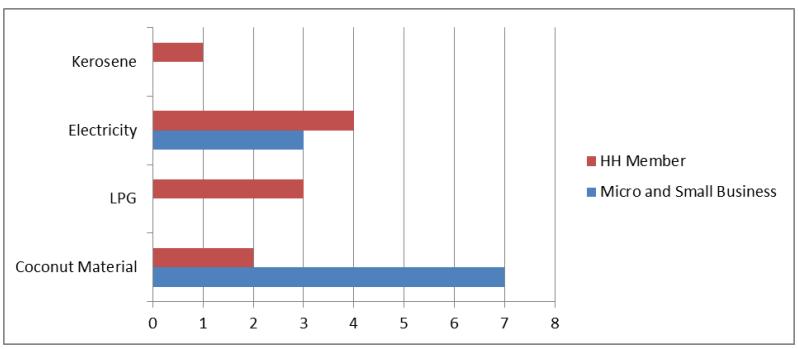

Figure 4. Most Frequent Used Energy by the Informant
Source : Data Processed, 2018

There is other problem about the *gonofu,* the Micro and small business would not be able to do the fumigation if they do not have *gonofu.* Sometimes they would use firewood instead of *gonofu,* but it takes more time and costly. Using *gonofu* they could finish the fumigation by 2 hours, but using firewood, it would take up to 6 hours. With a cheaper energy choice, the Micro and small business could decrease their production cost but it doesn't make the production increase for certain Micro and small business. The *ikan cakalang fufu* Micro and small business could use firewood as their energy choice, it is cheaper than *gonofu* but it is not efficient, using firewood is more time consuming and less production could be achieved.

Lack of energy and Unemployment

The lack of availability in energy source caused the Micro and small business to find other options available or not to do the production at all, because with the other option they spend more to gain the same profit. These lacks of availability in energy source become one of the main reasons why the Micro and small business in decrease almost 50% in number. They didn't see any more potential profit in it and decide to switch. The switch process later lead to unemployment, some of the Informants are not having permanent jobs.

Energy Choice

Six out of ten key informants main reason in choosing their energy is based on the energy availability, while the other reason are the price and the efficiency (they think that energy is the best one for them to use).

Table 3. Business' Owner Reasoning

Informant	Reason for choosing energy	
	1st reason	Other reason
A	Fit to the function	Availability
B	Availability	-
C	Availability	Price
D	Fit to the function	Availability
E	Availability	Price
F	Availability	-
G	Availability	-
H	Price	Availability
I	Fit to the function	-
J	Availability	-

Source: Data Processed, 2018

Energy Saving

Currently all of the Informants are not saving their energy, 8 out of 10 of the Micro and small business does not have any intention to reduce their energy usage because they do not want to lose their profit and think that the current production process are good already, so they does not have any intention to switch into renewable energy or to applied the more advanced tech. They prefer to do the fumigation process in traditional way.

Table 4. Energy Saving

Currently save energy	Intention to save energy
No	None
No	Have
No	Have
No	None
No	None
No	None
No	None
No	None
No	None

No	None

Source: Data Processed, 2018

Upgrades were primarily driven by cost-benefit analysis and not sustainability-related motivations (Christensen., Robinson and Simons 2018). Although, the characteristic of *gonofu* are indeed well suited to be the choice of cakalang fufu producers, both from the cost and the fact that the production process times are shorter, but the *gonofu* availability is not steady. Stacking *gonofu* in inventory is not a good option either, since the producer of *cakalang fufu* won't be able to run their production activity if there are no fishes delivered. Raw materials have a significant effect on company performance. The availability of raw materials cannot be controlled by the company and there can be constraints on the production process (Omar., Barbara and Daniel, 2000). Residents are using the energy to meet their daily demands (Li et al, 2015). Rahut et al (2014) wrote that richer households tend to use cleaner energy for lighting, cooking, and heating, indicating that with the rise in income and increase in accessibility to the energy markets, households will switch to cleaner sources of energy. However, many of the Informants are not using LED lamps at their home and workplace, and none of the Informants owns an electric stove to cook. All of the Informants are using coconut material for grilling fish and few of them use firewood, although briquettes are available on the market, none of the Informants are using it as alternatives. This indicates that the income of the household does not make them tend to be more energy efficient. The high rate of energy consumption would deplete the energy reserve (Mujiyanto and Tiess, 2013).

CONCLUSION AND RECOMMENDATION

Conclusion

The data collected suggested that energy management still poorly executed by the micro and small business, 50% of their expenditures is for energy spending. But most of the energy they allocate for idle activities. With a cheaper energy choice, the Micro and small business could decrease their production cost but it doesn't make the production increase for certain Micro and small business. The *ikan cakalang fufu* micro and small business could use firewood as their energy choice, it is cheaper than *gonofu* but it is not efficient, using firewood is more time consuming and less production could be achieved. While the household member does have the intention to reduce their energy usage, they admit that it will be hard since some of their idle activities, watching television and charging phones had become necessity. The awareness of energy saving is also still low, the micro and small business do not want to reduce their energy usage because they do not want to lose any profit. And they not optimize the energy by allocating it for production use instead they mostly used the energy for idle activities. Most of the micro and small business are not satisfied with their current economy and the energy availability. While the cheaper energy choice could decrease the production cost, it does not eventually increase the production, because it is not the cheaper energy that needed but the right choice of energy.

Recommendation

1. The data collected suggested that energy management still poorly executed by the micro and small business, 50% of their expenditures is for energy spending. But most of the energy they allocate for idle activities. Micro and small business need to use renewable energy in their home activities, the cost could be considered high, but in long term it is cheaper and more environmental friendly.
2. Some of the production activities that couldn't switch to other energy option, it is recommended to cooperate with the energy supplier, make a new supply chain, where the supplier become the micro and small business permanent partner to ensure the energy supply.
3. The micro and small business still lack of awareness and information regarding the renewable energy availability, the government could give more information and training to increase the awareness of the Micro and small business to save their energy by optimizing it.

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