

## INFLUENCE HYBRID RESOURCES TOWARD SUSTAINABILITY AT MICRO-HYDRO MANAGEMENT IN AMBAPA VILLAGE

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### ABSTRACT

This research illustrates the relationship analysis and influence of Hybrid Resources on the sustainable construct of Micro-hydro management. Hybrid Resources is an appropriate long-term solution in addressing the limitations of Micro-hydro Resources in the long dry season and is a variable that affects the sustainability of power plant management. The relationship and influence of these two constructs can be analyzed statistically inferential by applying Confirmatory Factor Analysis (CFA) partial and full model. The results of the partial model test showed that the estimation model of the reflection relationship of each of the variable Hybrid Resources and sustainability of its manifest variables had met the Critical Ratio (CR) and Standard Loading Factor (SLF) values. Furthermore, full-model test results show that the model estimation of relationship and influence between Hybrid Resources on sustainability variables is positive and significant and has fulfilled the criteria Of Good of Fit (GOF). The most dominant manifest variable of gaining an indirect influence reflection of Hybrid Resources is of energy consumption of 0.746 and the manifest variable that most predominant gets reflection of the indirect influence of sustainability construct is the application of strict sanctions when properly proven use of the illegal energy by 0.704. The direct influence between Hybrid Resources against the sustainability construct by 0.260.

**Keywords:** *Hybrid Resources, Sustainable, CFA Parsial and Full Mode*

### 1. INTRODUCTION

Some Micro-hydro resources have been built by the central government, local governments (PEMDA), cooperatives, non-governmental organizations (NGOs), and private companies. But there are still many problems of Micro-hydro management both technical and non-technical and require serious handling and coordination (Riadi, 2016). This condition is the case for some of the development of Micro-hydro resources in some remote villages in Indonesia, including the Micro-Hydro Ambapa power plant located in the East Kolaka Area of Southeast Sulawesi Province. The existence of Microhydro resources in the area generally can only operate normally during the rainy season with a variety of technical reasons, such as the decrease in river water potential due to the long dry season and others. Based on the case, the provision of electrical energy is expected not only depends on water resources only, but also needs the potential source of other primary energy that is converted into electrical energy (BPS Kolaka Timur, 2014), so it can cover the technical shortage of resources Micro-Hydro. Some alternative solutions from previous research (Fulsele, 2012; Abdul, 2013) can be applied, but the research has not involved the influence of variable Hybrid Resources on its sustainability. Although researchers have developed Micro-Hydro as Hybrid Resources but still have not analyzed the relationship and influence on its continuation (Kanata, 2015; Naim, 2019). Therefore, this research was demonstrated a concept of development of Micro-Hydro as Hybrid Resources which related and will affect the sustainability of power plant management in Ambapa village.

## 2. MATERIALS AND METHODS

### 2.1. Development of Micro-hydro as Hybrid Resources

The conceptual definition of Hybrid Resources is merging 2 or more existing resources to serve the needs of sustainable electrical energy, such as the incorporation of Micro-hydro and solar (Deepak, 2011; Kanata, 2015). Hybrid Resources are a latent variable that cannot be measured directly, so it is necessary to measure the manifest variables (indicators) of that construct (Haryono, 2017). The latent variable (construct) of Hybrid Resources consists of dimension of resources operation (PS) and energy consumption (PE) and several manifest variables as seen in figure 1. The application of Hybrid Resources can provide continuous energy supply in the long dry season as well as on cloudy weather in the rainy season (PS1). In the long dry season, water discharge will be decreased, so the energy supply is also reduced. When the weather is cloudy, the sunlight intensity starts to decline, so the solar cell module (Custer, 2014) is experiencing a decrease in energy for charging the battery (PS2). Reduced battery energy charging will cause a very limited energy supply (Kahar, 2016). Similarly, the local wisdom of society that always preserves the forest (PE3) will make the water discharge will be sustainable throughout the year (Akhadi, 2009). On the other hand, resource development into Hybrid Resources will add a power reserve (PS4). In addition to the use of electrical energy also required user policies in limiting energy consumption (PE1), as well as classification of energy consumption in the user community so that the plant is not overloaded (PE2), but expected to increase electricity dues not exceeding the electricity tariff of PLN monthly (PERMEN ESDM No. 28, 2016), so that users can carry out the obligation to pay dues every month (PE3), The voltage and frequency are stable even at night so that the benefits gained by the user's community are aligned with its obligations (PE4).

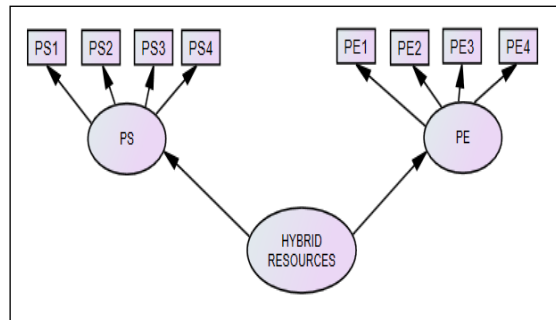


Figure 1. Path Diagram of Hybrid Resources Construct

### 2.2. Management of Sustainable Resources

Conceptual Definition of Sustainability is the management of continuous, reliable and high power plants in fulfilling the electrical energy needs of the user community without neglecting the established joint agreements, the monitoring and application of periodic sanctions and conflict resolution systematics as well as management rights and tiered groups (Kunneke, 2009; Chadijah, 2011).

In the application of a joint agreement between the manager and the user community, it is necessary that the user involvement in treating and enforcing the rules and Conditions (KB1), the manager as early as possible to anticipate the changes in or outside the regulation (KB2) and the managers distribute the power evenly without any discrimination (KB3) and users pay the electricity dues with full awareness on time each month before the organizer applies the sanctions, the manager is expected to continuously follow up with the community report quickly and appropriately (PB1), if proven by users to commit violations that could damage the power plant operating system and harm the user's security, the electrical Energy Connection (PB2) is carried out and if there is a conflict between the user and the maintainer, then the conflict resolution is done according to the set stage (MP1) and apply the management's basic budget (MP2) as well as the determination of energy consumption rules. The management of the plant can take place permanently, if the form

and implementation of the management is supported by the Government, namely the Government officially recognizes the management of the plant (PH1) and the government officially supports the management of the plant in the village (PH2) as well as government support for the development of management in a level group business form (PH3), as seen in figure 2.

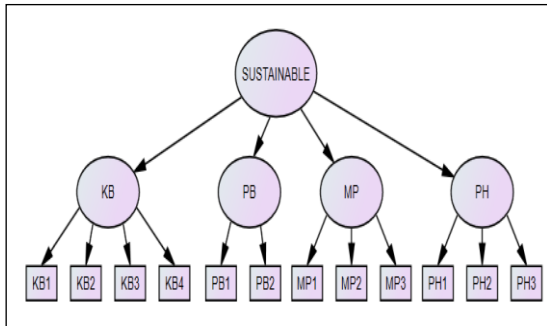


Figure 2. Path Diagram of Sustainable Construct

### 2.3. Operational Concept of Construct

The operational concept of the construct Hybrid Resources and sustainability gives the idea that there is a causal relationship between the two constructs. The variable Hybrid Resources that can be measured from the indicators describe that the operation of Hybrid Resources can supply continuous power to the user community by involving sustainability that can be measured from the indicators. The casual relationship can be seen in the Model estimate (see figure 3).

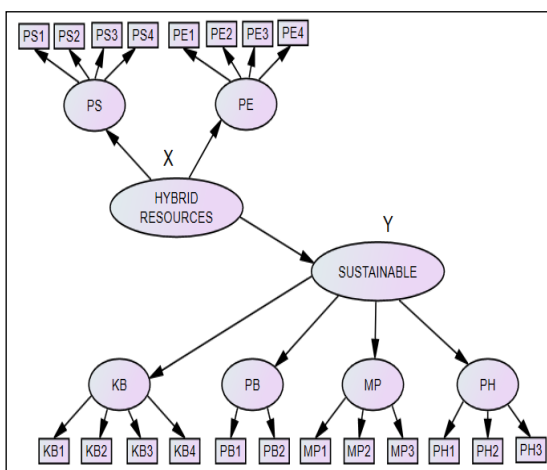


Figure 3. Full Model Estimasi

Figure 3 shows that resource development as Hybrid Resources will increase sustainability construct, as well as vice versa. This means the construct of Hybrid Resources gives a positive effect (X) referred to as an exogenous construct and a sustainability that gets a positive influence called the endogenous (Y) construct.

Based on the theory of the construct of Hybrid Resources and sustainability, the research hypothesis can be taken as follows:

1. The Hybrid Resources construct affects positively and significantly against its manifest variables
2. The Sustainable construct affects positively and significant againts its manifest variables
3. The construct of Hybrid Resources (X) has a positive and significant effect to construct of Sustainable (Y)

### 3. RESEARCH METHOD

The selection of research types is a type of quantitative study with a qualitative data quantized. This research is based on the conceptual theory of the IAD Framework and Principle Design (Suyuti, 2012). Research manifest variables are obtained from the CPR infrastructure by developing Micro-hydro resources into Hybrid Resources (Naim, 2019). Research is still holistic, complex, and dynamic, so the problem is still temporary and will develop after the researchers enter the data retrieval stage. The data retrieval method is to quantize all indicators of the respondent's answer option in the form of a score. Furthermore, raw data obtained is processed (validation and reliability test) by using SPSS program Application (Herlina, 2019) which generates data entry in the form of raw data of the right and trusted Hybrid Resources and sustainability. The Data entry of each variable is analyzed by using the measurement model (Outlier Model). With the support of the application program AMOS 24 (Santoso, 2018) It generated 2 sets of variable fit models with a significant and valid. Furthermore, the variable model that has Fit is merged into a full model whose construct is causal connected (the model estimation). The model was tested using the structural model (Inner Model). The test results are an early structural model with

interconnected construct and affect the simultaneous exogenous and endogenous construct. The model will be tested again and examined using CFA Full Model (Haryono, 2017). The results obtained using the CFA Full Model are a fit structural model that can be analyzed the relationship and influence between the constructs.

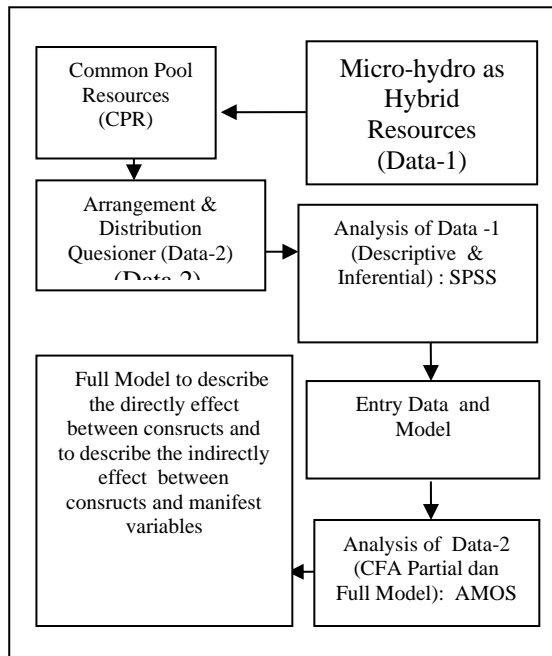


Figure 4. Research Steps

### 3.1. Research Steps

The initial step of the study was the first collection of data conducted through survey to Micro-hydro location and live interviews with managers. The results of data collection in the form of qualitative data (data-1) are considered as material considerations in the creation of research instruments (see Figure 4). Besides, the results of previous research could be a strong theory in composing the instrument. Furthermore, there may be a statement or questions in the questionnaire that will be distributed to respondents as many as 215 user community. Based on the method Likert (Herlina, 2014), a collection of statements or a scoring form of numbers 1 to 5. The results of data-2 collection will be processed with the Excel program application and the data is described, and then tested by using the SPSS application program to be data entry. Furthermore, data entry in the form of raw data

is analyzed using the application program AMOS (Haryono, 2017; Santoso, 2018). From the results of the analysis obtained a fit model consisting of the direct influence of an exogenous against endogenous construct and indirect influence on the manifest variables.

### 3.2. Variable Instruments and Research Data Collection

Based on the results of data collection and research results of the most recent (Herawati, 2010; Suyuti 2012), the instruments and data collection results (see tables 1 and 2).

Table 1. Variable Instrument, and Data Collection Result of Hybrid Resources Construct

Exogeneous Construct	Dimen Sions	Mani- fest Variable	STS* (1)	TS* (2)	N* (3)	S* (4)	SS* (5)
Hybrid Resources (X)	PS	PS1	0	3	39	114	59
		PS2	0	5	53	87	70
		PS3	0	3	57	64	91
		PS4	0	1	59	75	80
	PE	PE1	0	3	51	63	99
		PE2	0	1	71	71	72
		PE3	0	4	61	56	94
		PE4	0	1	57	66	91

\*STS = Very Disagree \*TS=Disagree, \*N=Neutral, \*S = Agree, \*SS= Very Agree

The variable consists of 1 set of exogenous construct of Hybrid Resources and 1 set of endogenous construct of Sustainable, and 6 dimensions and 20 statements or manifest variables (codes).

Table 2. Variables Instrument and Data Collection Result of Sustainable Construct

Endo- genous Construct	Dimen Sion	Mani- fest Variables	STS* (1)	TS* (2)	N* (3)	S* (4)	SS* (5)
Susta- inable (Y)	(KB)	KB1	4	13	79	56	65
		KB2		10	82	63	56
		KB3	1	9	85	65	55
		KB4	3	16	74	67	55
	(PB)	PB1	7	37	64	107	
		PB2	5	63	61	86	
	(MP)	MP1	1	5	43	39	107
		MP2			44	66	105
		MP3	1	7	55	64	88
	(PH)	PH1			52	41	117
		PH2			47	75	93
		PH3		3	66	82	64

## 4. DATA ANALYSIS

### 4.1. Validity and Reliability Tests

Before the measurement of the model, the data obtained through the questionnaire instrument was tested in advance with the test

of reliability and data validity (Hartono, 2016; Sujaweni, et al, 2019) in general, validity indicates the degree of determination of the measurement results of a questionnaire. Reliability is the level of consistency of the instrument used. If there is a question that does not qualify in this test, the manifest variable is removed.

**• Test of Construct Validity of Hybrid Resources, and Sustainable**

In essence, a validity test is a Coefisen gauge correlation between the score of a question or an indicator tested with a total score on its variable. The suitable method used in this study is Corrected item-total Correlation because it has a lot of data (Herlina, 2014), where the validity of the results can be known to all the question items if  $r_{table} (0.153) < r_{count}$ , the indicator is valid. The test result of a resource blend variable generates  $r_{count}$  each variable of its manifest greater than 0.153 except the PS5 variable is 0.129 ( $r_{count} < 0.153$ ), so the PE4 variable is invalid (removed). While the results of the test Varaibel sustainability generates  $r_{count}$  each of its manifest variables is greater than 0.130 except KB2 (0.123) and KB3 (0.058), so the KB2 and KB3 variables are invalid (removed).

**• Tests of Reliability Construct of Hybrid Resources, and Sustainable**

In essence, a reliability tests are used to determine the consistency of a questionnaire. The method used in this research is the method of Cronbach's Alpha (Herlina, 2014). When  $\text{Alpha} = 0.6-0.79$ ; Reliability is acceptable and when  $\text{Alpha} > 0.8$ ; Good reliability. The test result of the manifest variable of the resource mix latent variable generates the Alpha value of each manifest variable between the values 0.6 – 0.79. This means all the reliability of the manifest variables is acceptable. While the test result of the manifest variable of the sustainable construct results in the Alpha value of each manifest variable between the values 0.70 – 0.79. This means all the reliability of the manifest variables is acceptable.

**4.2. Measurement Single Model of Hybrid Resources Construct**

The Measurement single model is part of an SEM model consisting of a latent variable (a construct) and several manifest variables (indicators) that can explain the relationship and influence of latent variables to the indicators (Santoso, 2018). The measurement model used in this study was the single measurement model. The estimation of this measurement model is done independently or on any of the construction that comes from a strong theory, as in Figure 5.

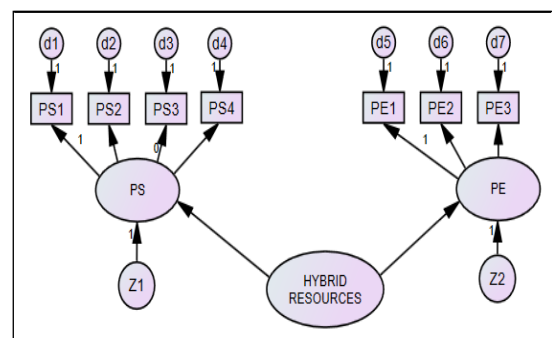


Figure 5. Initial Model of Hybrid Resources Construct

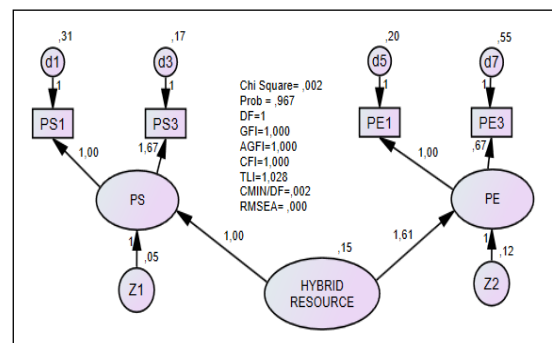


Figure 6. Model Fit of Hybrid Resources Construct

The initial and fit model are in AMOS and measurement as shown in figures 5 and 6. Assuming negative variant and covariant are found, a modification is made to the measurement model. However, in the final result, no negative variants and covariants were found. Therefore, it proceeds with significance testing to the dimensions and indicators that reflect the construct and validation test. The construct measurement

model is accepted, assuming the Critical Ratio (CR) is  $\geq 1.96$  or Probability (P) is  $\leq 0.005$  and Loading Factor Standard (LFS) is  $\geq 0.5$ . Similarly, the model is fit assuming the validation test is accepted with the Criteria values mostly fulfilled (see table 3 and 4) dan (Chi Square (0,002)  $\leq 3,841$ , (P=0,967) is  $\geq 0.05$ , Degree Freedom (DF=1) is  $> 0$ , Goodness of Fit Index (GFI=1,000) is  $\geq 0.9$ , Adjusted Goodness of Index (AGFI=1,000) is  $\geq 0.9$ , Comparative Fit Index (CFI=1,000) is  $\geq 0.95$ , Tucker-Lewis Index (TLI=1,028) is  $\geq 0.95$ , (CMIN/DF=0,002) $\leq 2$ , Root Mean Square Error of Approximation (RMSEA=0,000) is  $\leq 0.08$  (Haryono, 2017).

Table 3. Test Results of Hybrid Resources Construct

Relationship between variables	C.R.	P
PS <--- HYBRID RESOURCES	5,300	***
PE <--- HYBRID RESOURCES	5,300	***
PS1 <--- PS	7,102	***
PS3 <--- PS	7,102	***
PE1 <--- PE	5,970	***
PE3 <--- PE	5,970	***

\*\*\*< 0,001

Table 4. Loading Factor Standard of Hybrid Resources Construct

Relationship between variables	Estimate
PS <--- HYBRID RESOURCES	0,867
PE <--- HYBRID RESOURCES	0,875
PS1 <--- PS	0,629
PS3 <--- PS	0,879
PE1 <--- PE	0,847
PE3 <--- PE	0,544

• **Direct and indirect influence of Hybrid Resources Construct against manifest variables**

Table 5 shows that a total of two dimensions and four manifest variables, were directly (PS and PE) and indirectly (PS1, PS3, PE1, and PE3) influenced, respectively.

• **Hypothesis Test**

Hypothesis H1 is accepted because the Hybrid Resources reflects relationships and indirect influences on manifest variables PS1 (0,476), PS2 (0,741), PE1 (0,761), and PE3 (0,545).

Table 5. Total, Direct and Indirect Effects

VARIABLES	HYBRID RESOURCES		
	Direct Effect	Indirect Effect	Total Effect
PE	0,875	0,000	0,875
PS	0,867	0,000	0,867

VARIABLES	HYBRID RESOURCES		
	Direct Effect	Indirect Effect	Total Effect
PE3	0,000	0,476	0,476
PE1	0,000	0,741	0,741
PS3	0,000	0,761	0,761
PS1	0,000	0,545	0,545

4.3. **Measurement Single Model of Sustainable Construct**

The model measurement used in this study was the single model measurement (Santoso, 2014). This estimation Model is done independently or on any of the construct that comes from a strong theory, as in Figure 7.

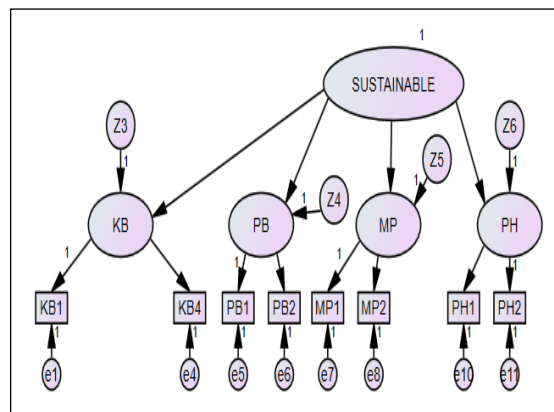


Figure 7. Initial Model of Sustainable Construct

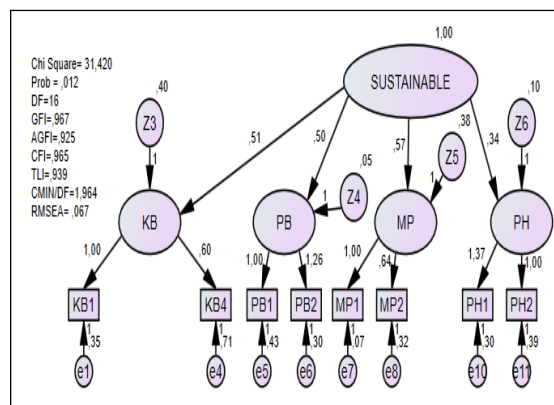


Figure 8. Model Fit of Sustainable Construct

The estimated model in Figure 7 is an entry model of the AMOS application program. The results of the analysis obtained the measurement model as in figure 8. If you still find the variant and the negative covariant then the modification of the measurement model. In the final result is no longer found variant and covariants valuable negative. Thus it can be followed by testing the significance of the dimensions and indicators that reflect effec

construct to manifest variables (see table 6 and 7) . When the Critical Ratio (CR) is  $\geq 1.96$  or probability (P)  $\leq 0.05$  and the factor Loading Standard  $\geq 0.5$  then the model measurement of the construct is acceptable, and the FIT model. Validation test received with criteria (Chi Square (26.296)  $< 31.420$ , Prob (0.012)  $\geq 0.05$ , (DF = 16)  $> 0$ , (GFI = 0,967)  $\geq 0.9$ , (AGFI = 0,925)  $\geq 0.9$ , (CFI = 0,965)  $\geq 0.95$ , (TLI = 0,939)  $\geq 0.95$ , (CMIN/DF = 1,964)  $\leq 2$ , (RMSEA = 0,067)  $\leq 0.08$ )) mostly fulfilled (Haryono, 2017).

All indicators on table 7 measurement models have a value of CR  $\geq 1.96$ , (P = \* \* \*)  $< 0.05$  and FLS  $\geq 0.5$ . So that the model of sustainability measurement on Figure 8 is acceptable and the model is fit as most of the model validation test criteria are met.

Table 6. Test Results of Sustainable Construct

Relationship between variables	C.R.	P
KB <--- SUSTAINABLE	6,757	***
MP <--- SUSTAINABLE	8,642	***
PH <--- SUSTAINABLE	5,677	***
PB <--- SUSTAINABLE	7,451	***
KB4 <--- KB	4,138	***
KB1 <--- KB		
PB2 <--- PB	7,155	***
PB1 <--- PB		
MP2 <--- MP	7,572	***
MP1 <--- MP		
PH2 <--- PH		
PH1 <--- PH	5,572	***

Table 7. Loading Factor Standard of Sustainable Construct

Relationship between variables	Estimate
KB <--- SUSTAINABLE	0,630
MP <--- SUSTAINABLE	0,683
PH <--- SUSTAINABLE	0,738
PB <--- SUSTAINABLE	0,912
KB4 <--- KB	0,499
KB1 <--- KB	0,808
PB2 <--- PB	0,781
PB1 <--- PB	0,642
MP2 <--- MP	0,689
MP1 <--- MP	0,955
PH2 <--- PH	0,591
PH1 <--- PH	0,754

• **Direct and indirect influence of Sustainable Construct against Manifest Variables**

In table 6, it is seen that four dimensions are directly influenced and eight indicators that are influenced indirectly by the sustainability, namely the direct influence on the KB, MP, PB

and PH while not directly affected by KB1, KB4, MP1, MP2, PB1, PB2, PH1 and PH2.

Table 8. Total, Direct and Indirect Effects

VARIABLES	SUSTAINABLE		
	Direct Effect	Indirect Effect	Total Effect
PH	0,738	0,000	0,738
MP	0,683	0,000	0,683
PB	0,912	0,000	0,912
KB	0,630	0,000	0,630
PH1	0,000	0,556	0,556
PH2	0,000	0,436	0,436
MP1	0,000	0,653	0,653
MP2	0,000	0,471	0,471
PB1	0,000	0,585	0,585
PB2	0,000	0,713	0,713
KB1	0,000	0,509	0,509
KB4	0,000	0,315	0,315

• **Hypothesis Test**

Hypothesis H1 is accepted, because the Sustainable reflects relationships and indirect influences on the manifest variable on the KB1 (0,509), KB4 (0,315), PB1 (0,585), PB2 (0,713), MP1 (0,653), MP2 (0,471), PH1 (0,556) and PH2 (0,436).

**4.4. Measurement Structural Model**

In measurement structural model, both of the already fit variables are combined into a structural model consisting of a construct of a Hybrid Resources into an exogenous and a construct of Sustainable into an endogenous.

Based on previous research, a exogenous construct of Hybrid Resources blend was formed from 4 manifest variables affecting the Sustainable endogenous construct consisting of 10 manifest variables as shown in Figure 9.

Influence of Hybrid Resources Exogenous construct against sustainable endogenous construct can be analyzed by using a full model CFA model. The results of the analysis resulted in a structural model (Full Model) as in Figure 10 which can be tested for signification, validation and its use as in Table 9. If it still encountered variant and the negative Kovarian then done modifications to the structural model. In the final result is no longer found variant and covariants valuable negative. Thus it can be continued by testing the significance of the dimensions and indicators that reflect the construct and validation test of the Strktural model.

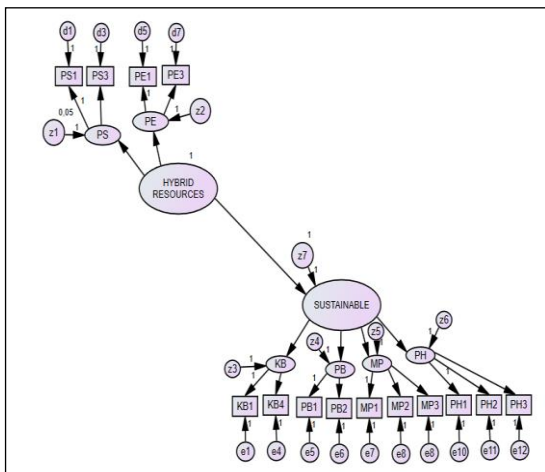


Figure 9. Initial Full Model

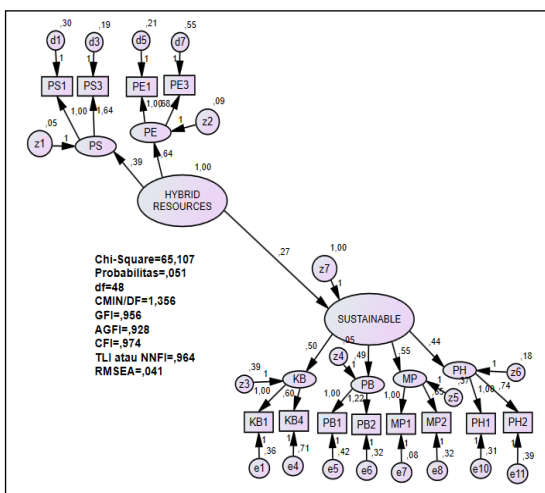


Figure 10. Full Model of Fit

When the Critical Ratio (CR)  $\geq 1.96$  or Probabability (P)  $\leq 0.05$  and the Loading factor Standard  $\geq 0.5$  The structural model is acceptable, the validation test is received or already fit with the criteria (Chi Square (65,171)  $< 65,107$ , Prob (0.051)  $\geq 0.05$ , (DF = 48)  $> 0$ , (GFI = 0,956)  $\geq 0.9$ , (AGFI = 0,928)  $\geq 0.9$ , (CFI = 0,974)  $\geq 0.95$ , (TLI = 0,964)  $\geq 0.95$ , (CMIN/DF = 1,356)  $\leq 2$ , (RMSEA = 0,041)  $\leq 0.08$ ) is mostly already full. (Haryono, 2017).

All manifest variables on the table 9 and 10 measurement model have a value of CR  $> 1.96$ , (P = \* \* \*)  $< 0.05$  and FLS  $> 0.5$ . So that the structural model in Figure 10 is acceptable and the model is already fit because most of the model validation test criteria has been met,

Table 9. Test Results of Full Model

Relationship between variables		C.R.	P
SUSTA INABLE	<--- HYBRID _RESOURCES	2,729	0,006
MP	<--- SUSTAINABLE	8,618	***
PH	<--- SUSTAINABLE	7,311	***
PB	<--- SUSTAINABLE	7,621	***
KB	<--- SUSTAINABLE	6,875	***
PS	<--- HYBRID _RESOURCES	6,439	***
PE	<--- HYBRID _RESOURCES	9,670	***
PB2	<--- PB	7,255	***
PB1	<--- PB		
MP2	<--- MP	7,648	***
MP1	<--- MP		
PH2	<--- PH	5,599	***
PH1	<--- PH		
KB1	<--- KB		
KB4	<--- KB	4,230	***
PS1	<--- PS		
PS3	<--- PS	7,094	***
PE1	<--- PE		
PE3	<--- PE	6,139	***

Table 10. Loading Factor Standard of Full Model

Relationship between variables		Estimate
SUSTA INABLE	<--- HYBRID _RESOURCES	0,260
MP	<--- SUSTAINABLE	0,684
PH	<--- SUSTAINABLE	0,738
PB	<--- SUSTAINABLE	0,914
KB	<--- SUSTAINABLE	0,642
PS	<--- HYBRID _RESOURCES	0,865
PE	<--- HYBRID _RESOURCES	0,904
PB2	<--- PB	0,770
PB1	<--- PB	0,652
MP2	<--- MP	0,694
MP1	<--- MP	0,948
PH2	<--- PH	0,595
PH1	<--- PH	0,748
KB1	<--- KB	0,806
KB4	<--- KB	0,501
PS1	<--- PS	0,630
PS3	<--- PS	0,860
PE1	<--- PE	0,841
PE3	<--- PE	0,548

• **Direct and indirect influence of Hybrid Resources Construct against Sustainable**

In table 11, It appears that 6 dimensions are directly influenced and 12 manifest variables that are influenced indirectly by the construct of sustainable, namely the direct influence on the PS, PE, KB, MP, PB and PH while not directly affected by PS1, PS3, PE1, PE3, KB1, KB4, MP1, MP2, PB1, PB2, PH1



and PH2.

Table 11. Direct and Indirect Effects

VARIABLES	HYBRID RESOURCES		SUSTAINABLE	
	DIRECT EFFECT	INDIRECT EFFECT	DIRECT EFFECT	INDIRECT EFFECT
SUSTAINABLE	0,260	0,000	0,000	0,000
PE	0,904	0,000	0,000	0,000
PS	0,865	0,000	0,000	0,000
KB	0,000	0,167	0,642	0,000
PH	0,000	0,191	0,738	0,000
MP	0,000	0,178	0,684	0,000
PB	0,000	0,237	0,914	0,000
PE3	0,000	0,496	0,000	0,000
PE1	0,000	0,760	0,000	0,000
PS3	0,000	0,744	0,000	0,000
PS1	0,000	0,545	0,000	0,000
PH1	0,000	0,143	0,000	0,552
PH2	0,000	0,114	0,000	0,439
MP1	0,000	0,168	0,000	0,649
MP2	0,000	0,123	0,000	0,475
PB1	0,000	0,155	0,000	0,596
PB2	0,000	0,183	0,000	0,704
KB1	0,000	0,134	0,000	0,518
KB4	0,000	0,083	0,000	0,321

#### • Hypothesis Test

Hypothesis H1 is acceptable, because the Hybrid Resources is a direct and significant effect on the Sustainable construct of the Critical Ratio = 2.729 or (CR)  $\geq$  1.96 and Probabability = 0.006 or (P)  $\leq$  0.05.

## 5. DISCUSSION

Based on the results of the 2nd order CFA test of the Hybrid Resource construct toward Sustainable construct, are being described as follows:

### 5.1. Effect of Hybrid Resource to Dimension of Resource Operation and Energy Consumption

- Hybrid Resources proved to have relationship and influence as well as significant to the dimension of resource (PS) has fulfilled the criteria. Hybrid Resources directly affected the 0865 against the operation of the Resources reflected in the presence of a 0545 influence of resource operations against the fixed power supply variable even though the discharge of the river water was reduced (PS1) and had an effect of 0744 with Forest Sustainability (PS3). This means that the variable sustainability of the forest is still influential enough and most dominant in overcoming the atom of power supply needed by the user community even though the discharge of the

river water has begun to decrease. The operation of water resources together with solar resources to cover each other's shortcomings and weaknesses, causing the power supply does not cease to meet the needs of the community. Similarly, the operation of the resources jointly influenced by forest sustainability is an effort to maintain water resources by maintaining the continuity of the electrical energy supply of users in the dry season. This effort will surely overcome the shortage of water resources in the dry season and also make forest preservation as a reflection of the most dominant indirect influence of Hybrid Resources in the development of Micro-hydro management as Hybrid Resources.

- Hybrid Resources proved to be related and directly influential and significant to the dimensions of electrical energy consumption that has fulfilled the criteria. Hybrid Resources directly affected 0.904 against the use of electrical energy (PE) which is reflected by the indirect influence of Hybrid Resources of 0.746 against the manifest variable of energy consumption restriction (PE1) and has an effect of 0.496 on the electric Energy tariff manifest variable (PE3). This means that the restriction of energy consumption is of great impact and is most dominant in anticipating the use of excess and use less energy compared to the increase in electricity tariff. The energy restriction of any community of users will cause Hybrid Resources to work continuously without the overload of resources and also make the energy restriction get a reflection of the most dominant indirect influence of Hybrid Resources in developing Micro-hydro management as hybrid Resources.

### 5.2. The Relationship and Influence of Sustainability on Mutual Agreements, Monitoring of Periodic Sanctions, Conflict Resolution Mechanisms and Management Rights and Level Groups

- Sustainable is proven to have relationships and direct and significant impact on the dimension of mutual agreement (KB). Sustainability has a direct effect of 0.642 on a mutual agreement reflected by the indirect

influence of sustainability at 0.518 against the rules of enforcement following the provisions (KB1) and an indirect influence of 0.321 on the payment of dues of electricity per month (KB4). With the enforcement of the rules according to the agreement, the user will not conduct illegal energy consumption and the organizer performs the duties and responsibilities according to the respective fields without any interference from outside. Similarly, with the awareness and participation of the Community pays the obligation of electricity energy dues make the maintainer can work professionally and the maintenance of the plant is better so that it improves the reliability of the system.

- Sustainable is proven to have relationships and direct and significant impact on the dimensions of periodic sanctions monitoring (PB). Sustainability has a direct effect of 0.914 on the adherence of periodic sanctions that is reflected by the indirect influence of sustainability at 0.596 against the immediate and precise direct monitoring indicators of the Community Complaints Report (PB1) and the indirect influence of 0.704 on the execution of strict sanctions in the form of electrical energy disconnections when users are proven to have committed violations (PB2). With the rapid and strict sanctions against users who proved guilty then the implementation of management will run well and the reliability of power distribution will be assured, so that the plant continues to operate continuously.
- Sustainable is proven to have relationships and direct and significant effect on the dimensions of conflict resolution mechanisms (MP). Sustainability has a direct effect of 0.684 on conflict resolution mechanisms reflected by indirect influence on conflict resolution following the established rules (MP1) of 0.649. Similarly, with indirect influence on conflict resolution following the basic budget of power plants (MP2) of 0.475. With the settlement of conflicts based on the rules set and the basic budget of management, the management function and the rights of managers and user obligations are understandable, so the chances of conflict is very small.

- Sustainable is proven to have relationships and direct and significant impact on the dimensions of management rights and level groups (PH). Sustainability has a direct effect of 0.738 on the influence of management rights and level groups that are reflected by the indirect influence of sustainability on the indicators of the Government's existence in support of the issuance of management permits (PH1) by 0.552. Similarly, sustainability has an indirect effect on the implementation support and management development (PH2) of 0.439. With management permits, the operation of the plant can run without local political influence and management can be developed and independent when supported the facilities and amenities of both regional and central governments.

### 5.3. Influence of Hybrid Resources Construct against Sustainable

Hybrid Resources proved to be a direct and significant effect on the sustainability criteria with the value of Critical Ratio = 2.673 or (CR) > 1.96 and Probabability = 0.008 or (P) ≤ 0.05 and the full model formed has fulfilled the criteria Of Gold Of Fit (GOF). Hybrid Resources has a direct effect of 0.260 on sustainability. This means that the development of the Micro-Hydro generator as Hybrid Resources is an alternative solution in the management of sustainable plants. Hybrid Resources on the management of the plant is reflected by the indirect influence of electricity distribution at any time with cheap electrical energy tariff, mutual agreement, compliance of periodic sanctions, mechanisms of conflict resolution and the management and implementation rights of the Government. The relationship of the kibat of Hybrid Resources to sustainability can be written in a structured equation:

$$Y = 0.260X + C \quad (1)$$

Where:

- Y = Construct of Sustainability
- X = Construct of Hybrid Resources
- C = Measurement Error

#### 5.4. Comparison of Previous Methods

Testing of Parsial models and full models using the CFA method to gain influence between variables is a model of CPR-based development that is most precisely applied to the concept of development of Micro-hydro Resources as Hybrid resources in remote Remote. The advantages of this method compared to the previous method (Kunneke, 2009; Suyuti, 2012). is a method in the study can test the estimation model with two or more latent variables that cannot be measured simultaneously. Besides, this method can also involve all the theoretical variables contained in the CPR infrastructure (Polsky, 1999; Chadijah, 2011) in creating an estimation model and can confirm the model and measurement data through a test to obtain a fit model by removing its insignificant manifest variables (Haryono, 2017). The Model fit and structural equations (1) that are produced can help describe the relationship of influence between variables to be valid, reliable on the concept of Micro-hydro resource development as Hybrid Resources in a remote village.

#### 5.5. Recommendation on implementing this Research Result

The results of this study can be used as a parameter in determining the scale of development Micro-Hydro as Hybrid Resources priorities. The development of management by setting priorities as a Hybrid Resources is the most strategic effort in Sustainable for the management and community. Therefore, the following are recommended in implementing Hybrid Resource Power Management model:

- Creating a development program as a hybrid resource by involving sustainable power management.
- Carrying out restrictions on the use of electricity to obtain a fair distribution of electrical energy and anticipate excess usage.
- Develop a forest and environmental conservation Program and the maintenance of river banks and dams to ensure the discharge remains sustainable.
- Review the sanctions that have been given to users and managers who have committed

violations and do not perform their obligations periodically.

- Give strict sanctions to users who use electrical energy illegally based on their basic budget and applicable provisions.

## 6. CONCLUSION

Based on the results of analysis and discussion of the relationship and influence of the construct of Hybrid Resources and sustainability and to each of its manifest variables in the management of the micro-hydro power plant in Ambapa village, it can be concluded as follows:

- Hybrid Resources directly affected 0.904 against the use of electrical Energy (PE) which is reflected by the indirect influence of Hybrid Resources of 0.746 against the manifest variable of energy consumption restriction (PE1) and has an effect of 0.496 on the electric Energy tariff manifest Variabel (PE3). Power supplies with limited debits, power reserve, restriction and classification of energy consumption, as well as the increase of electricity energy dues. The manifest variable that has the most dominant influence is the power supply with limited discharge (0.856).
- Sustainable has a direct and significant impact on the periodic (PB) Sanctions monitoring dimension. Sustainability has a direct effect of 0.914 on the adherence of periodic sanctions that is reflected by the indirect influence of sustainability at 0.596 against the immediate and precise direct monitoring indicators of the Community Complaints Report (PB1) and the indirect influence of 0.704 on the execution of strict sanctions in the form of electrical energy disconnections when users are proven to have committed violations (PB2).
- Hybrid Resources directly and significantly affect the sustainability criteria with the value of Critical Ratio = 2.729 or (CR) > 1.96 and Probabability = 0.006 or (P) ≤ 0.05 and the full model formed has fulfilled the criteria of Gold Of Fit (GOF). This Model can illustrate that Hybrid Resources construct has a direct effect of 0.260 on sustainable construct.

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