Available online at www.rajournals.in

RA JOURNAL OF APPLIED RESEARCH
ISSN: 2394-6709
10.31142/rajar/v4i4.13
Volume: 04 Issue: 04 April-2018

International Open Access
ICV- 74.25
Page no.- 1638-1648

Inter Institutional Roles to Provision Non Clasical Raw Water on Village Level (Case on Bendungan Village, in Ciawi Sub-Districts, Bogor District)

Agus Susanto[1], M. Yanuar J. Purwanto[2], Bambang Pramudya[3], Etty Riani[4]

[1]PhD student of Environmental and Natural Resource Management, Bogor Agricultural University
[2]Lecture, Department of Environmental and Civil Engineering, Bogor Agricultural University
[3]Professor, Department of Agricultural Industry Technology, Bogor Agricultural University
[4]Lecture, Department of Aquatic Resource Management, Bogor Agricultural University

ARTICLE INFO

Published Online:
28 April 2018

ABSTRACT

Based on water balance analysis in Ciliwung Hulu watershed, it shows that Ciseuseupan sub watershed belongs to vulnerable water category. Of the 8 villages in the Ciseuseupan sub watershed, there is a Bendungan village that is most vulnerable in the provision of raw water, because in the provision of raw water is still dependent on natural reliability such as rivers, springs, wells, and others. This research discusses water vulnerability solutions at the village level, with a non classical approach. The method used is ISM ((Interpretatif Structural Model),with emphasis on 4 (four) elements to be structured in relation to the provision of raw water ie: (1) needs of the program, (2) the main obstacle, (3) purpose program, and (4) institutions involved in program implementation. Therefore, it is required an independent water provision expert, involving various parties. The purpose of this research is to build an institutional role model in the provision of non classical raw water. The results show that: to realize a new paradigm in the provision of non-classical raw water, the main constraint is quality of human resources (village officials, communities, and NGOs), which must be resolved first, so that they can participate jointly together to build the infrastructure by adequate socialization.

Corresponding Author:
Agus Susanto

KEYWORDS: human resources quality, infrastructure, sosialisation

1. Introduction

Village have an important rulles for the people to develop their surrounding areas, but up until now village has always been marginalized, unindependent, this cause by the concept of village is still viewed with a narrow perspective, cause by the low quality of human resources, thus have less role in development of the village. With the enactment of the Law "UU No. 6 Tahun 2014 tentang Desa". The Villages are to be expect to be more independent, more over after the Nawacita program lauch by the current government (2015-2019), it say that "Indonesia Development starts from the outskirt by strengthening the regions and villages whitin the framework of united nation" (The third Article of Nawacita)

In order to conduct the the demand of raw water, the villagers (country folk) rely on the natural availability such as river, springs etc. The people dependance of the nature for the raw water cause the position of villager are endagred, because the different variation of nature conditions in producing water determine how the raw water demand can be fullfiled for them (Purwakusuma,W,2011)

The phenomenon of the nature resourch of raw water supply can be seen in villages within DAS Ciliwung Hulu areas, based on the water balance analysis, it's seen that DAS ciseuseupan belong to the category of Sub DAS – raw water prone with scale of 3 (water prone). Sub Das Ciseuseupan are structured of 8 villages. From the 8 villages, Bendungan village is the most vulnerable village in the provison of the raw water. It cause due the highest population density compared to the other villages, reaching 7.615 inhabitants /km2 (BPS,2015). Futhermore, the avalibility of the raw waterfor proverty-stricken people are still convensional which is to gatered the water springs in the riverbank with the container tube and so when the dry seasons will be evaporated, in addition, the acsess to the springs is far enough, nevertheless for the more capable and wealhty people used the service of the PDAM Tirta Kahuripan Branch X Ciawi.

To provide the supply of the raw water in the scale of the village, a new paradigm is needed, which is the non-classic provition of raw water supply, where the water waste, domestic and non-domestic waste are reused as the

new raw water. To support the paradigm, Research has been made to develop the role of structure between institutions to provide raw water supply, according to Dunn (2000) one of main point to success of an activity/business is determind by the role mechanism of the identity of the elements / attributes that exist in the inter-institutional linkages to achieve the goal. The purpose of this research is to build the structure of elements / important attributes and mechanisms of inter-institutional role in the provision of non-classic raw water at the scale of the village

2. Method of Analysis

The location of the research is in Bendungan Village located in DAS Cieuseupan, which is part of the DAS Ciliwung Hulu watershad, with coordinates of 606'55 "- 606'76" LS, and 10608'25 "- 10608; 59" BT. as presented in Figure 1. The research location is selected based on the analysis of the vulnerability of water resources in each sub watersgad of Ciliwung Hulu watershad.

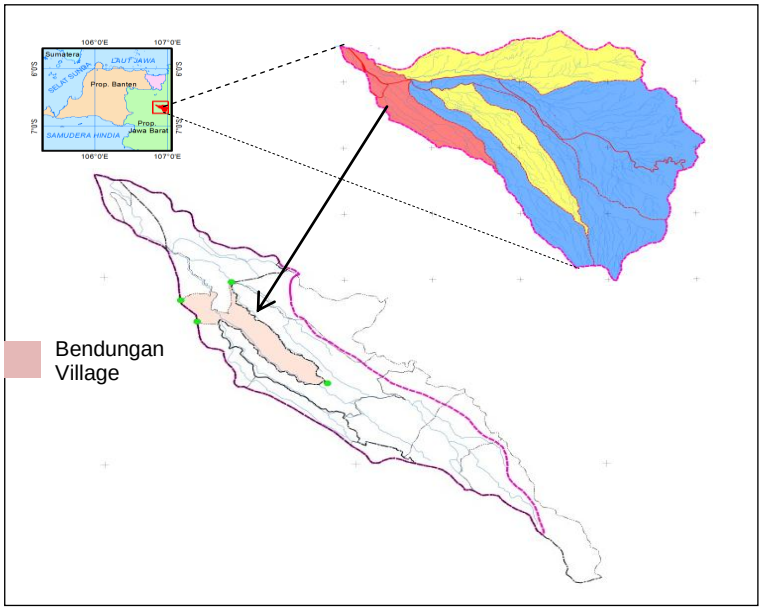


Figure 1. Research Site Bendungan Village, Ciawi sub District, Ciseuseupan sub watersahad

This research used ISM soft ware master (Interpretative Structural Modeling). Used secondary and primary data. Secondary data were obtained from Ciawi District Statistics Agency 2010 - 2015, Regional Spatial Planing (RTRW) of Bogor Regency in 2008 - 2028, and from a literature related to institutional development. While primary data were obtained based on in-depth interviews with four experts respondents, namely: 1) Department of Public Works of West Java Province, 2) Bappeda Bogor Regency, 3) Staff of Ciawi sub District, and 4) community leaders of Bendungan village, and field observation . The method used is direct interview using ISM instrument. (1) Identification of elements, (2) contextual relation of elements, (3) SSIM (Structural Self Interaction Matrix), (4) RM (Reachability Matrix), (5) Digraph, and (6)) ISM (discussion of analysis results).

The analysis conducted using ISM method with input: program requirement, major constraint, program objectives, and Institution involved in implementation of village raw water supply program in Bendungan village, Ciawi sub-district, Bogor regency (Eriyanto 2007). The ISM preparation steps are presented in Figure 2

Element Identification

Element Identification is an early stage for analyzing related elements based on expert judgment with interview method, as well as the tupoksi of each element.

Contextual Relation

Contextual relationships are the interrelationships between sub elements / attributes expressed in rows and columnsComperative linkages . It means that sub-element A is more important than sub element B, and vice versa.

Structural Self Interaction Matrix (SSIM)

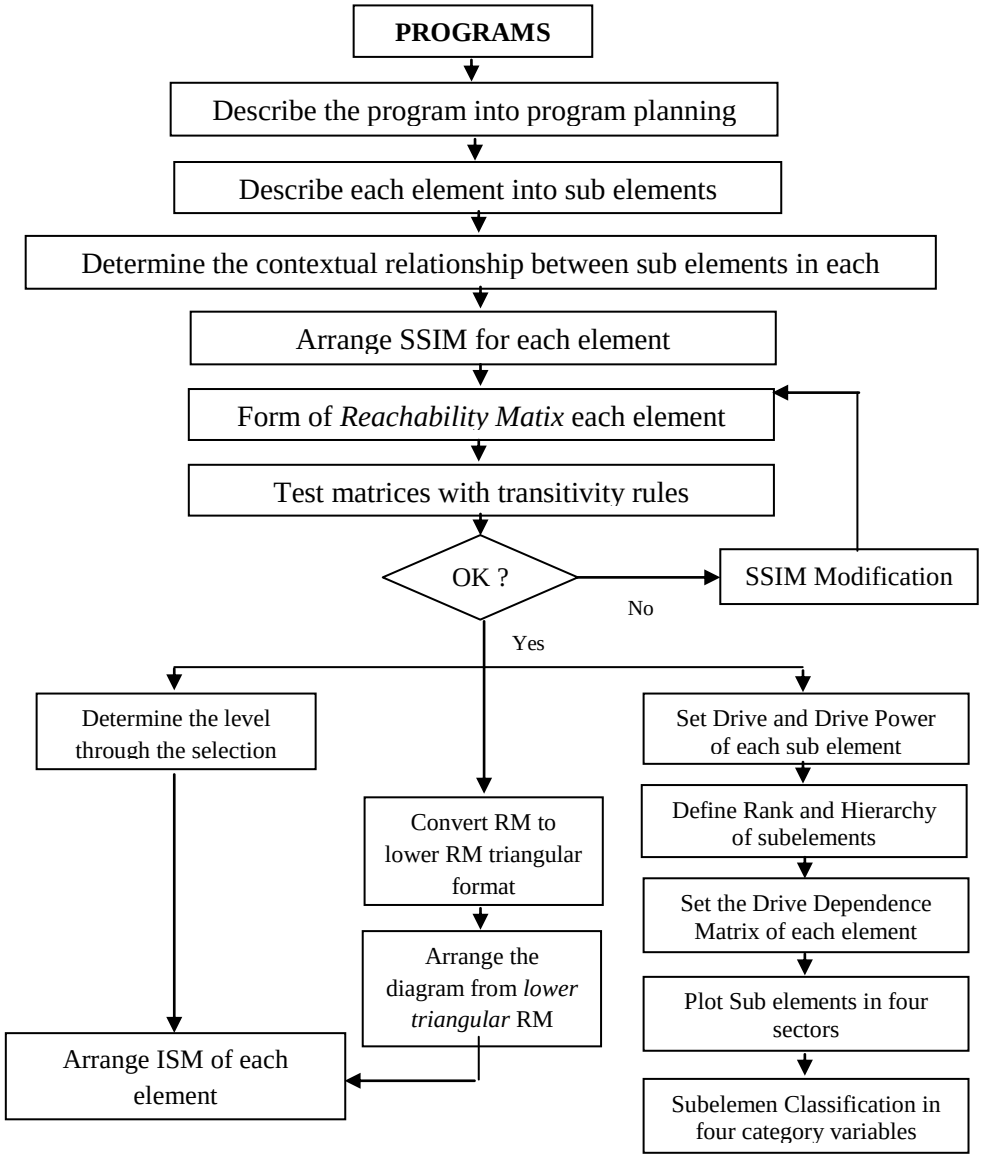
Base on contextual relations, then arranged*Structural Self Interaction Matrix (SSIM)*, which uses simbol V, A, X, dan O, where:

V if eij = 1 and eji = 0
A if eij = 0 and eji = 1
X if eij = 0 and eji = 1
O if eij = 0 and eji = 1

- Understanding the value eij = 1 s that there is a contextual relationship between sub elementsto -i andto -j, while the value eji = 0 is no contextual relationship between sub elementsto-i andto-j.
- V if eij = 1 and eji = 0; V = sub elementto1must be first handled than sub elements to-j.

- A if eij = 0 and eji = 1; A = sub elementto-j must be handled first compared to sub elementsto-i.
- X if eij = 1 and eji = 1; X = both subelements must be handled together.
- O if eij = 0 and eji = 0; O = both subelements must be handled together

The next step is to compare rows into columns for relationships between key factors in the form of letters (V, A, X, O).



Sours: Suxena, 1992 in Marimin, 2004

Figure 2. Stages of Analysis in the ISM Software

Reachability Matrix

Reachability matrix (RM) is a statement of relationships with 1 and 0. By definition, the symbol 1 is a contained or there are a contextual relation, whereas the symbol 0 is missing or there is no contextual relationship between elements I and j, and vice versa. After the SSIM is filled according to the respondent's opinion, then the symbol (V, A, X, O) can be replaced with symbols (1 and 0) with the existing provision so it can be known the value of RM.

Digraph

Digraph (*directional graph*) is the stage where the result of the Reachability matrix is plotted into the graph, so that it can see the relationship between sub elements in the hierarhi diagram or in the Driver Power (DP) matrix under the following conditions:

- Sector 1; *weak driver-seak dependent variables* (*Autonomous)*; Sub elements that enter the sector 1 if: DP value ≤ 0.5 X and D value ≤ 0.5 X, X is the number of elements
- Sector 2; *weak driver-strongly dependent variables* (*Dependent*); Sub elements that enter the sector 2 if: DP value ≤ 0.5 X and D value ≥ 0.5 X

- Sector 3; *strong driver – strongly deopendent variables* (*Linkage*); Sub elements that enter the sector 3 if: DP value> 0.5 X and D value> 0.5 X
- Sector 4; *strong driver-weak dependent variables* (*Independent*); Sub elements that enter the sector 4 if: DP value> 0.5 X dan D value ≤ 0.5 X.

In detail the digraph is presented in Figure3.

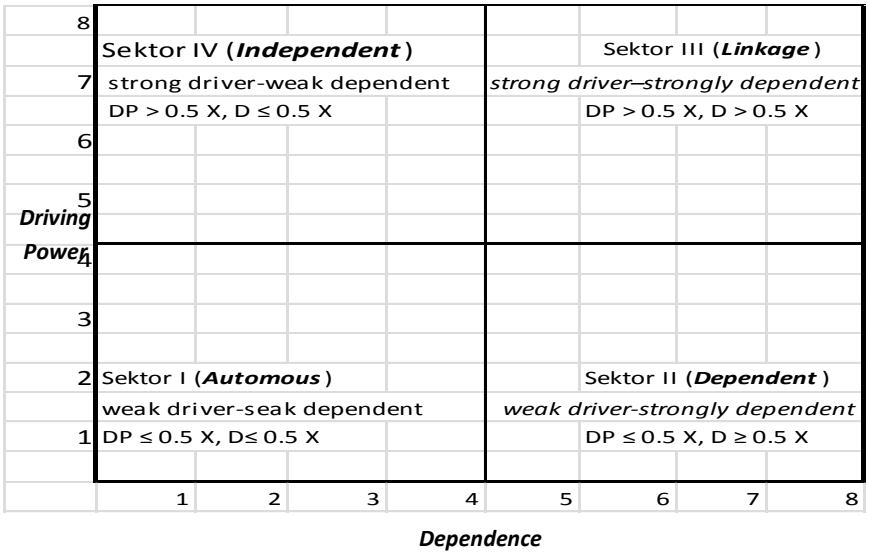


Figure 3. Digraph diagram in ISM

3. Results and Discussion

To support the role of villages for the supply of non-classical raw water, a structure of role is required between the related Institutional. Based on the results of water balance analysis shows that the village of Bendungan is very vulnerable in the supply of raw water, so it needs a solution which one of them is institutional analisys, by structuring the function and role between the institutionals, hope that the supply of a non-classical raw water in Bendungan village can be sustainaibly fullfiled.

Based on the results of identification of institutional elements from several sources including: Makmur Sianipar (2012), Nuraini C (2016), Mirah DA (2014), Susanto A (2010), Thamrin (2009), and Marpaung R (2011) and with in depth interview with the experts, establish 4 (four) elements on the development of role structure among non-classic raw water supply institutions at the village level,: (1) program needs, (2) main constraints, (3) program objectives, and (4) elements of partys that involved in the implementation of the program. The research of each element / attribute are elaborates into a number of sub elements / attributes based on suggestion from the expert, and then set the contextual relationships between sub elements. The relationship between elements in the role model of inter-institutional development is presented in Figure 4.

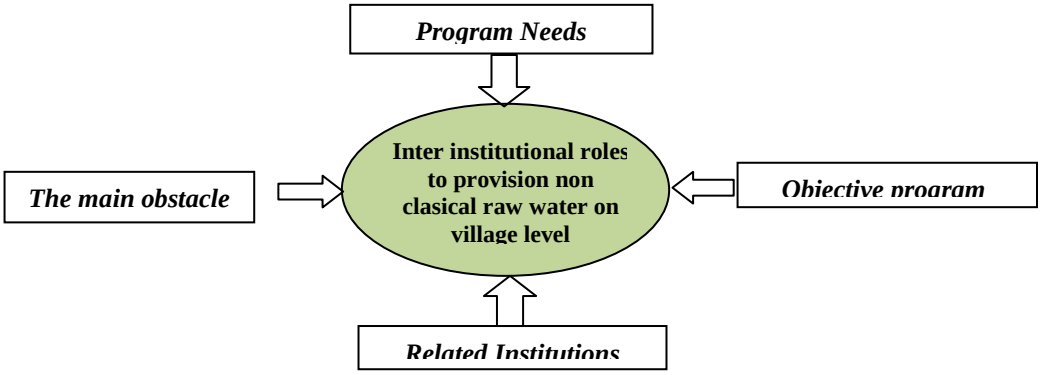


Figure 4. Relationship between elements in the Inter-Institutional Role on Non-Classic Raw Water Supply in the village

a. Program Needs in Non Classical Raw Water Supply

Based on the results of the identification and expert opinion, there are nine sub elements / attributes requirement of program needs in inter-institutional roles for non-classicraw water supply in Bendungan village (Figure 5C). The distribution of each sub element / attribute in the diagraph are:

Sector IV (power drivers) which is a sub-sector of key elements consisting of: limited raw water supply infrastructure (A), weak cross-sectoral cooperation (C), and lack of socialization (G). This Sector is the big powerfull

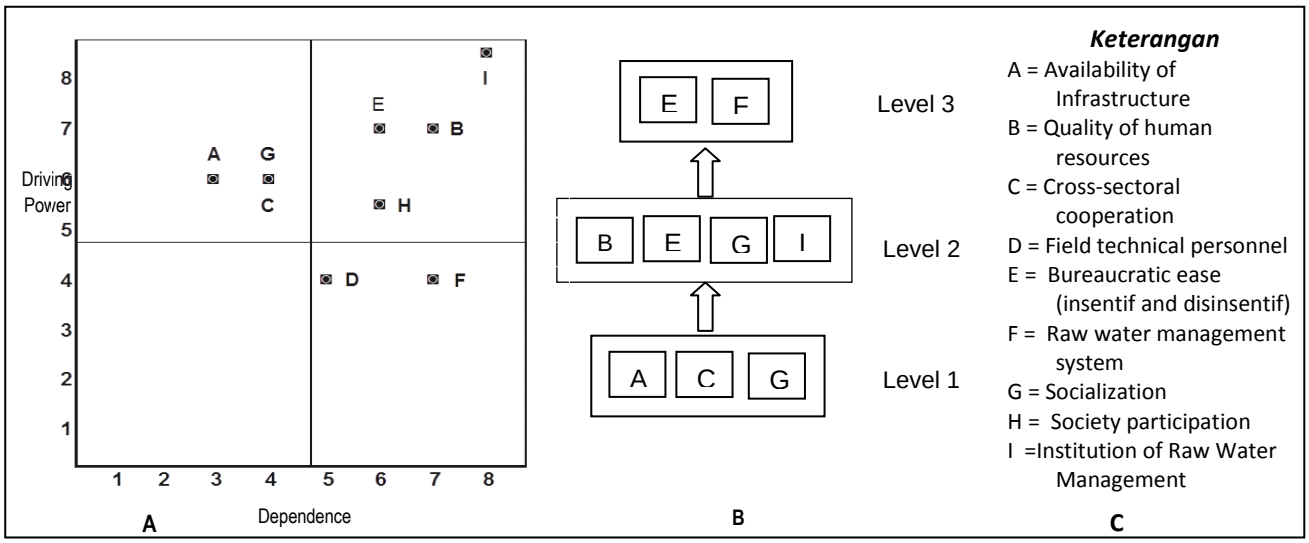
driving force (driver power) because it has a low level dependence towardsthe other needs attributes. If the three attributes are not handled properly, it will be the main constraining factor to the raw water supply program.

Weak cross-sectoral cooperation is a constraining factor. What accour in the field is there are rarely a conseling of aself-sufficient supply to the raw waterin the village community, this happens because the lack of field-workers expert. Provide of viable infrastructure, cross-sectoral cooperation, and routine conseling activities is needed to minimize the constraints of the provision of raw water.

Sector III (linkage); attributes / sub elements included are: quality of human resources (B), avaliability of a reliable field technical personnel (D), community participation (H), and establishment of good management institutions (I). These four sub elements have a driving force (driver power) on the success of increasing the inter-institutional rules programs in the village on the supply of the raw water, but also has high dependence on the sub-element of the other needs, because any action against the needs of this sub element will affect the success of the standard water supply program at the village level, and is vice versa if the sub elements get less attention, it can affect the failure of the raw water supply program at the village level.

Sector II (dependence); sub elements / attributes include: ease accses of bureaucracy (incentives and disincentives) (E), raw water management system (F). These two sub elements are the result of the improvement actions on the others programs requirement. If these two sub elements are met, then this sub element becomes very important. The hierarchical structure of relationships between sub elements of programmatic requirements is presented in Figure 5.B.

Handling the requirement of the program can be done through 3 (three) stages, namely: in the first stage has needs to be done is to equip or provide the necessary infrastructure, intensify cross-sectoral cooperation involving private parties, NGO and university also routinely presentation and seminar to the community about provision the raw water. If all three elements are met, and with supported by good human resources, and assisted by qualified field staff/conselors, and by involving the community, it will automatically form an institutional system that will encourage the ease of bureaucracy that eventually will form a good water management system in the village scale level.



Source: Processed Results, 2016

Figure5. Structuring the role of inter-institutional elements in the needs of the program in the provision of non-classic raw water at the village level

b. Main Obstacles in Non Classical Raw Water Supply

There are severals obstacles for provision the raw water supply at the village : Availability infrastructure (A), quality of human resources (B), partnership (C), responsibility of local government (D), responsibility of centrall government (E) , cross-sectoral cooperation(F), community participation (G), private involvement ((H), Institution of Raw WaterManagement (I), as presented in Figure 6C.

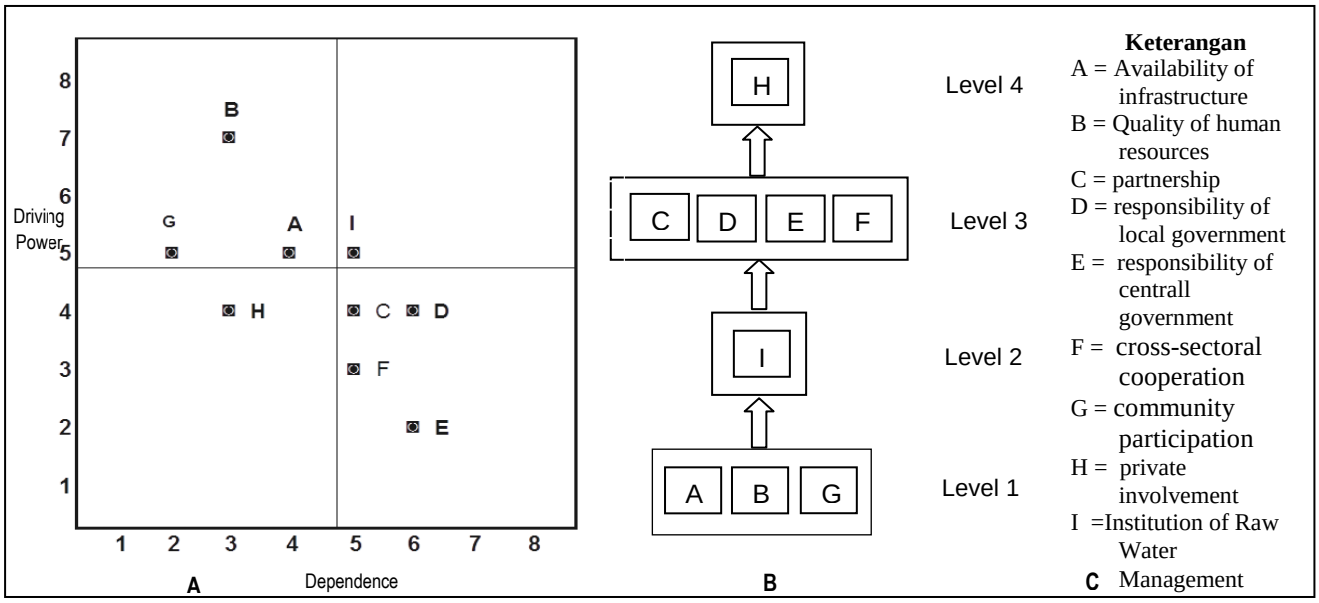
If those attributes are plotted in the diagram (Figure 6A), the result is: in sector IV (power drivers) / key elements, the attributes consist of: limited infrastructure (A), low quality of human resources (B), and low participation of the community (G). These three sub elements are the great driving forces (power drivers) in inter-institutional roles with low dependence on sub-elements of the other constraints. If these three sub elements are not handled properly, it will be the main inhibiting factor.

The quality of human resources in the village of Bendungan still low, and that is a one inhibiting factors. generally (60-80%) people in the Bendungan village are only able to enjoy primary education just up until junior secondary level (Junior high school), and even many of those do not finished (BPS, 2015). Similarly, informal education such as training related to provision of raw water is still rare or even they have never obtained. In addition of that, seminar and presentation activities in the form of counseling or other activities related to the provisionraw water are rare, because there are no extension workers, so when we associated it with constraints element, the lack of infrastructure, improving the quality of human resources, and the field activities is a major constraint that must be immediately outlined or completed in the provision of raw water framework.

The other sub elements that constitute the constraints are: un-establishment ofa institutions that regulate the provision of clean water (I). This sub element is located in sector III (linkage) which is a sub element that has a driving power (driver power) to the success of the role of inter-institutional, but has high dependence with other sub constraints

On the others hand, the sub-elements partnership (C), the responsibility of local government is still low (D), the responsibility of the central government is still low (E), and cross-sectoral cooperation is still weak (F), located in sector II (dependence) is the sub elements resulting from other constraint repair actions program. If several sub elements of the program constraints are met, there will be synergy between the central government and the local government, so this sub element becomes very important.

The last sub-element is the low involvement from the private parties(H), which is located in sector I (autonomous). This sector have low related with the role of inter-institutional and even nonexistent. The involvement of private parties can be important if they can contribute in the campaign of the importance of raw water supply, especially if it contributes to the infrastructure.



Source: Processed Results, 2016

Figure 6. Structuring the role of inter-institutional elements in constraints in the provision of non-classic raw water at the village level

Handling constraints can be done through 4 stages: in the first stage that need to be done is equip or provide the necessary infrastructure, improving the quality of human resources by equipping various skills and mastery of technology, especially in the provision of raw water, and also equally important is involving the community in the process of planning, implementation and supervision, because the community is a major element that will have to initiate independently. So far, the involvement of both local government and central government towards the provision of raw water is still low, moreover the private parties is almost non-existent, so strong inter-institutional role is necesarry. The hierarchical structure of the relationship between sub elements of raw water supply constraints at the village level is presented in Figure 6.B.

c. Objectives Program in Non-Classic Raw water Supply at the Village Level

Based on the result of identification and expert opinion, there are 9 (nine) sub elements / attributes of program objectives required in inter-institutional role on non-classic raw water supply in Bendungan village (Figure 7C). and

illustrated into the digraph digram (Figure 7A), and the result is:

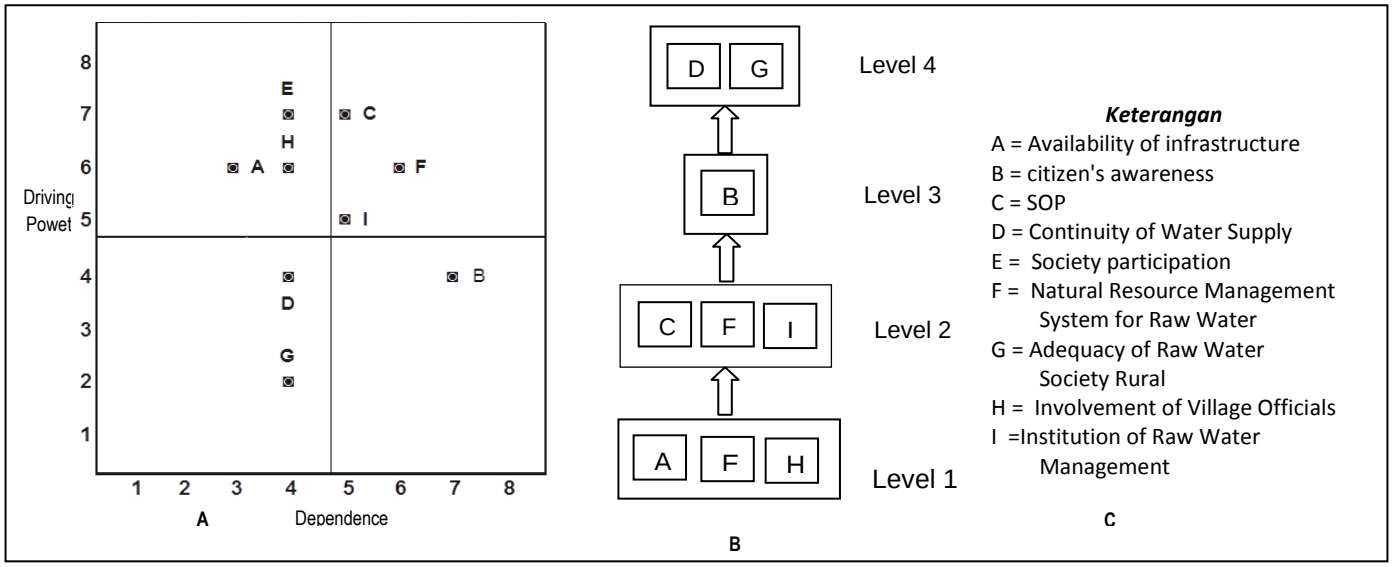
In sector IV (power drivers) which are the key elements, their sub elements / attributes include: limited infrastructure (A), low community participation (E), and low government employee involvement (H). All these three attributes are very influential in the role of inter-institutional and is a great driving force (driver power) because of the low dependence (dependence) on the attributes of the other program objectives.

The lack involvement from the government employee in the village can be an obstacle, due to the uncoordinated government employees with the community, as the result is community volunteraly builds reservoirs springs in the river banks, but in long dry season the water is drought out, so providing high quality infrastucture, high community participation, and the involvement of the government employee are urgently needed.

In inter-institutional roles the objective of the others attributes program are: Standard Operational Procedure (SOP) (C), natural resource management system for raw water (F), and institutional raw water management (I), located at sector III (linkage) , and is a sub element that has the driving force (driver power) to the success of increasing the role of inter-institutional in provisionraw water program, but has high dependence (dependence) with sub elements of the other program objectives.

With the not yet form of the natural resources management system will affectthe provision of raw water, so when associated with the attributes of program objectives, the continuity of water supply, community participation, involvement of government employee, and natural resource management system that must be elaborated or resolved soon.

While on the sub element of public awareness (B) is located in sector II (dependence). If several sub elements of the program's objectives are met then this sub element becomes very important. And the last sub elements of the program aim is continuity of the water supply (D), and the raw water sufficiency of village communities (G), located in sector I (autonomous). This sub-element have a very small relation and even not yet exist to other sub elements in the inter-institutional role onprovidingraw water, sofor provision the raw waterthe village community carried out independently in the form of small water reservoirs.



Source: Processed Results, 2016

Figure 7. Structuring the role of inter-institutional elements in the program objectives in the provision of non-classic raw water at the village level

In order to achieve the program objective on the inter-institutional role in the provision of non-classical raw water, it can be done through 4 (four) levels: in the early stages it is necessary to complete or provide the necessary infrastructure, and supported by the active role of the village government employee and participation from the community.

At the second level, involvement of the village government employee is intensified, in the present term is "blusukan" (an activity out into places that rarely passed or visited by people, such as forests, muddy rice fields, villages, and many other). This will encourage high community participation in the provision of raw water. This level will not work if it is not supported by a good natural resource management system, because if good natural resource management will affect the supply (continuity) of raw water resources. The ultimate goal of the inter-institutional role in the provision of raw water is the sufficiency of raw water of rural communities both in terms of quantity and quality. The hierarchical structure of the relationship between sub

elements of program constraints in the inter institutional role in the provision of raw water at the village level is presented in Figure 7.B.

d. The Involved Institution On The Implementation of an Inter-Institutional Role Program of Non-Classic Raw water Supply at the Village Level

There are 11 (eleven) sub-element / institutional attributes related to the inter-institutional role in the provision of raw water in Bendeungan village presented in Figure 8C. The attribute plot into a digraph diagram (Figure 8A), and the result is:

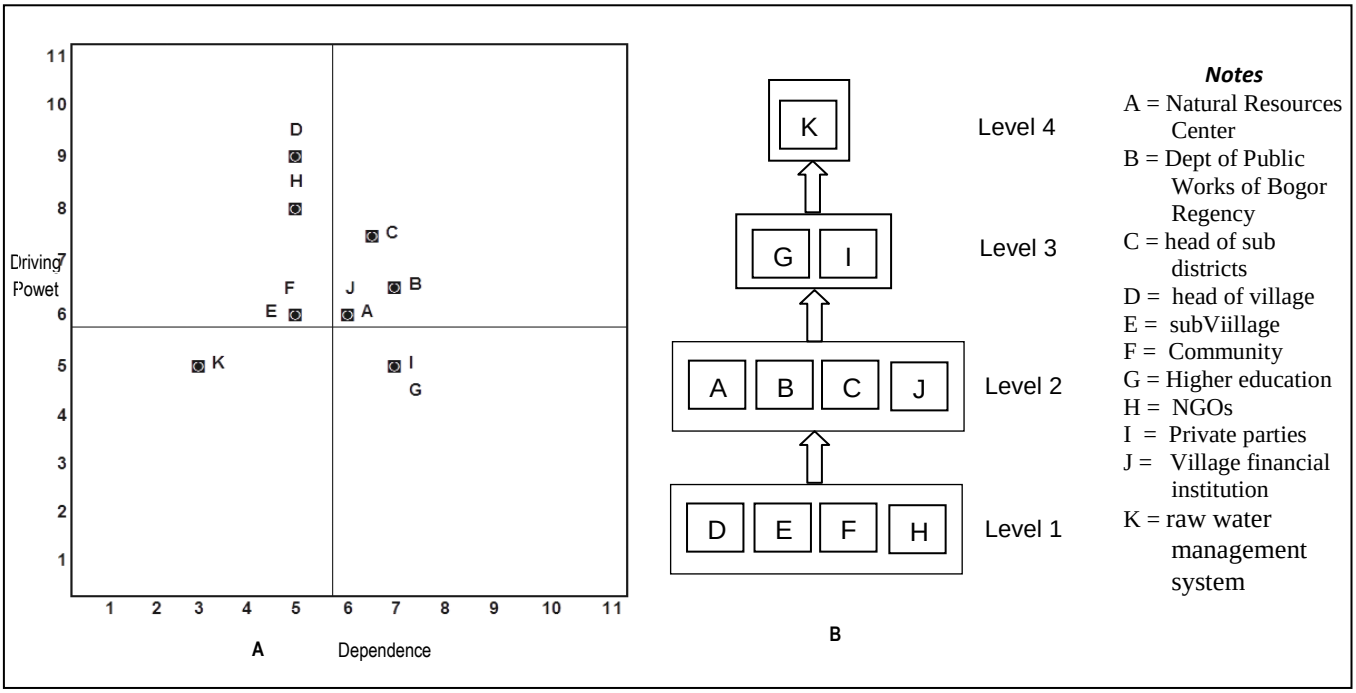
Sector IV (power driver) is a key element. Consist of the atributes: Village chief /Head (D), Government employee (E), community (F), and NGO (H). These sub-elements have large power drivers, with low dependencies on the others sub-element. These four sub elements will be a major constraints factor if did not handle it well

The community in Ciliwung Hulu (NGO) whose consist members of various professions that always educate the public about the importance of the Ciliwung River as a source of livelihood, not only in the upstream but also in the mid and downstream areas are the driving factor for the conservation of the Ciliwung Hulu watershed which affects the continuity of the raw water supply. therefore, the role of Village Chief Head and Village government employee in terms of provision of raw water is actually quite high, but not so visible currently, so if these four sub elements are associated with sub-elements of institutions associated with the implementation of programs to increase the role of inter-institutional in the provision of raw water, then the existence of NGOs, community participation, Village Head, and Village Apparatus will be necessary.

The other related institution are: Natural Resources Center (A), Department of Public Works of Bogor Regency (B), Sub-district (C), and Village financial institution (J). This sub element is located in sector III (linkage) which is a sub element that has the driving power (driver power) to the success of the standard water supply program at the village level, but has a very high dependency with other sub elements.

However the sub elements of Higher Education (University) (G), and Private parties (H) are located in sector II (dependence) which is a sub element as a result of other institutional improvement actions, if several sub elements of related institutions are met, then this sub element becomes very important. The role of universities in this institution is to give inputs on appropriate technology from the aspects of building construction and the aspect of maintaining water quality, while the private parties role is in technical and financial aspects, as well as providing guidance and advocacy.

The last of the sub element is: raw water management system (K), located on sector I (autonomous). This sub-element has a very small and even none relationship with other sub elements, because these system is not an institution but an institutional, therefore institutional success is the formation of a good system.



Source: *Processed Results, 2016*

Figure 8. Structuring of institutional roles in the institutional elements involved in providing non-classic raw water at the village level

The handling of related institutions in the implementation of inter-institutional role programs on the non-classic water supply in Bendungan village can be done through 4 (four) levels, i.e: the first level needs to be done is to activate the role of NGOs in form of: educate the community about conservation of Ciliwung Hulu watershed, the important of raw water supply at the village level, because if the village provided raw water independently, the Ciliwung Hulu watershed will be maintained automatically, so that the continuity of raw water supply can be sustainable. The built assumption is: if the upper part is sustainable, then the downstream part is also sustainable. It worked if society is involved, because society is not only as subject, but also an object. Appart of NGOs and communities, the role of Village chief Head and Village Government Employee also very important because it can provide motivators and facilitators in the provision of raw water, although up until now the role is still small.

At the second level (driving factor) includes: Natural Water Resources Centre, District Public Works Office, sub-district head, and village financial institutions, expected to synergize to establish rules of the implementation plan in the provision of raw water, it will encourage other institutions to contribute, while the third level is the University and Private parties. If their role involved futher more or upgraded from the current state, as what is set at the time of planning, and also at the time of implementation, it will be very meaningful, and eventually the institutions will develop natural resource management systems to meet the long-life sustainable water supply at the village level. The hierarchical structure of the relationship between related subgroups of institution to the implementation of the raw water supply program at the village level is presented in Figure 8.B.

e. Intergovernmental Role in Non-Classic Raw Water Supply in the village

Based on the results of ISM analysis on the four elements there are 13 (thirteen) sub elements / key attributes of the role of inter-institutional provision of non-classic raw water supply, and presented in Table 1. From the 13 sub elements there are 4 sub elements that are intercepted I.e : the infrastructure , socialization programs, community involvement, and village government employee, so that there are 8 sub elements / attributes left: (1) infrastructure, (2) NGO involvement, (2) cross-sectoral cooperation, (3) socialization programs, (4) Village chief head (5) government employee village, (6) community involvement, (7) improving the quality of human resources, and (8) NGOs

Table 1. The key element of each element in the inter-institutional role in the provision of non-classic raw water in the village

No.	Elemen	Elemen Kunci			
1.	Program needs	Infrastructure	Cooperation across sectors	Sosialisation	
2.	The main obstacle	Infrastructure	Quality of human resources	Sosialisation	
3.	Objective program	Infrastructure	Society participation	Village officials	
4.	Related institutions	Village head	Village officials	Society participation	NGOs

Source: Processed Results, 2016

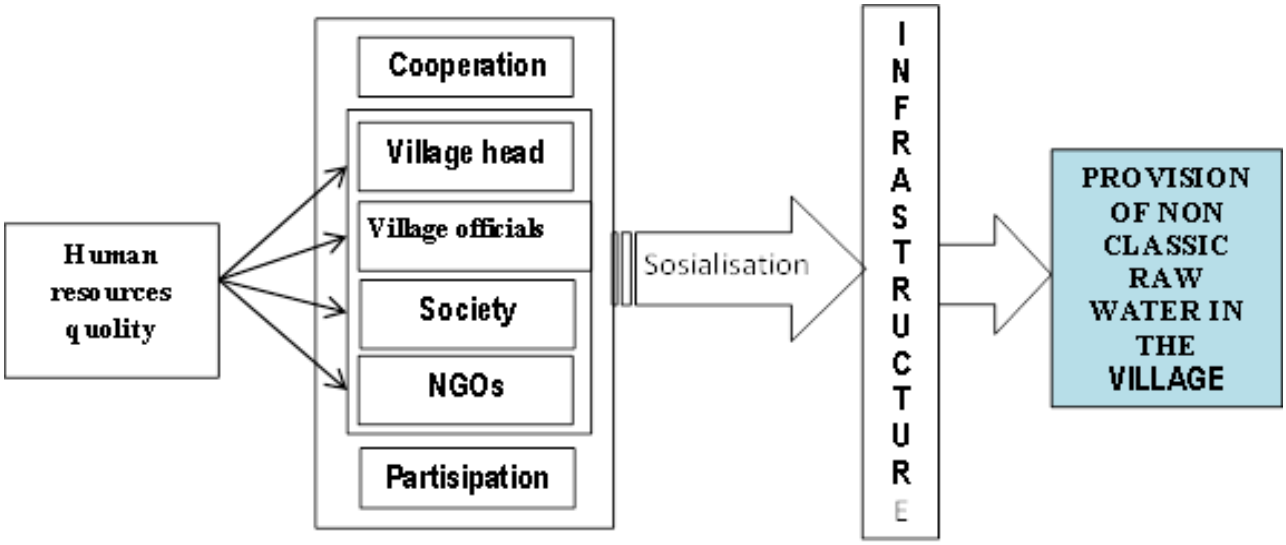


Figure 9. Development of Inter-institutional Role Structures in Non-Classic Raw Water Supply at village level

Furthermore, the built of the role structure between institutional development in the non-classical raw water supply presented in Figure 9. To realizing the new paradigm non-classical water supply, the main constraints is poor quality of human resources (government employe village

officials, community and NGOs), must be addressed and solved first so that they can participate and work together to build raw water supply infrastructure. In order for the construction of cooperation and participation to run well, it must be preceded by a good adequate enforcement/ introduction.

The assignment of each key element in the role of structure of inter-institutional non-classic raw water supply in the Bendungan village, when associated with the main component in village management accordance with the Law of Laws No. 6/2014 about Village, implementation is presented in Table 2.

Table2. The function of the main actors in the provision of non-classic raw water at the village level

No	Key elemens	Main actors			
		Village	Aparatur	NGOs	Socoety
1.	Infrastructure	Asets	Managers,	supervisors	Pemanfaat, pengelola, dan pengawas
2.	Head of village	Policy, Manager	Give an example, motivator	mitra kerja	Motivator,
3.	Human resources quality	Role & function enhancement	Role & function enhancement	Counseling and training	Role & function enhancement
4.	Socialisation	Counseling and training	Counseling and training	Counseling and training	Counseling and training
5.	Cooperation across sectors	Work partners	Direction and mentoring	Direction and mentoring	Direction and mentoring

Source: Processed Results, 2016

4. Conclusion

Based on the results of the ISM analysis concluded that:

1. The key elements of the four elements (program objectives, main constraints, program needs, and related institutions) for inter-institutional roles in non-classic water supply at the village level are: (a) availability of infrastructure, (b) quality of human resources, (c) community participation, (d) availability of infrastructure, (e) socialization, (f) Government employee in the village, (g) village chief head, and (h) NGOs
2. To actualize a new paradigm in non-classical water supply, the main problems is the low quality of human resources (village officials, communities and NGOs), and these constraints must be addressed first so that they can participate and work together to build the infrastructure provision of raw water. In order of cooperation and participation to run well, it must be preceded by adequate socialization

5. Refferenns

1. [BPS] Badan Pusat Statistik. 2015. *Kecamatan Ciawi Dalam Angka. 2014*. Badan Pusat Statristik Kabupaten Bogor. Jawa Barat
2. [Bappeda] Badan Perencana Pembangunan Daerah. 2005. *Rencana Tata Ruang Wilayah Kabupaten Bogor 2005 – 2025*. Bappeda Kabupaten Bogor
3. Dunn WN. 2003.*Pengantar Analisis Kebijakan Publik*. Gadjahmada University Press. Yogyakarta
4. Eriyatno. Sofyar F. 2007. *Riset Kebijakan Metode Penelitian untuk Pasca Sarjana*. IPB Press. Bogor.
5. Mirah DA. 2014. Penetapan Elemen Kunci Pengembangan Agroindustri Peternakan Dengan Interpretative Structural Modelling (ISM). *Zootek Journal*. Vol 34, No. 2 Juli 2014 (130-138)
6. Marimin. 2004. *Teknik dan Aplikasi Pengambilan Keputusan Kriteria Majemuk*. Gramedia Widiasarana Indonesia. Jakarta.
7. Marpaung R. 2011. *Model Pengelolaan Air Baku Air Minum Berbasis Daerah Aliran Sungai, Studi Kasus DAS Babon Semarang*. Desertasi. Sekolah Pasca Sarjana IPB
8. Nurain C , Dwidjono HD, Masyuri, Jamhari. 2016.Model Kelembagaan pada Agribisnin padiOrganikKabupaten Tasikmalaya. *Jurnal Agraris* Vol. 2 No.1
9. Purwakusuma W. Baskoro TDP. Sinukaban N. 2011.*Mengatasi Krisis Air di Desa*, dalam buku Menuju Desa 2030. Pohon Cahaya. Yogyakarta
10. Sianipar M. 2012. Penerapan Intrepretative Structural Modeling (ISM) Dalam Penentuan Elemen Pelaku Dalam Pengembangan Kelembagaan Sistem Bagi HasilPetani Kopi dan AgroindustriKopi.*Jurnal Agrointek* Vol.6,No.1.
11. Susanto A. 2010.*Strategi Kebijakan Pemanfaatan Air Tanah Sebagai Sumber Air*

Bersih di Kota Semarang yang Berkelanjutan.Tesis. Sekolah Pasca Sarjana IPB

12. Suxena JP. et. al. 1992. *Hierarchy and Classification of Program Plan Element Using Interpretative Structural Modelling*. System Practice. Vol 12.
13. Thamrin. 2009. *Model Pengembangan Kawasan Agropilitan Secara Berkelanjutan di Wilayah Perbatasan Kalimantan Barat (Studi Kasus Wilayah Perbatasan Kabupaten Bengkayang-Sarawak)*. Desertasi. Sekolah Pasca Sarjana IPB.
14. [UU]. Undang-Undang No. 6 tahun 2014 tentang Desa.Lembaran Negara Republik Indonesia Tahun 2014 Nomor 7.