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Procedia - Social and Behavioral Sciences 227 (2016) 202 – 209
Procedia Social and Behavioral Sciences

CITIES 2015 International Conference, Intelligent Planning Towards Smart Cities, CITIES 2015, 3-4 November 2015, Surabaya, Indonesia

(Adaptive) Networks in strategic areas in Indonesia

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Abstract

To develop and structure its areas, Indonesia under the national spatial plan has developed strategic areas. (National) strategic area is an area whose spatial arrangement is one of the priorities of the national interests. This paper is an exploration of the interactions and networks existing between two existing models of strategic areas in Sambas regency: Sambas district and Temajuk village. Besides, this paper also raises a concept “adaptive” which can developed from the existing networks’ characters. This study used network analysis approach and the exploration of “adaptive” concept. From both explorations, it is known that strategic areas tend to be oriented inside its own area and only spread to other near advanced areas/cities. This makes the relationship between the areas tend to be imbalanced. To develop a balanced/appropriate interaction, adaptive concept can be applied by strengthening the database, doing benefit-cost-risk analysis, identifying potential conflicts, making priorities, scenarios and corrective actions, as well as involving public.

Peer-review under responsibility of the organizing committee of CITIES 2015

Keywords: network; strategic; adaptive; Indonesia

1. Introduction, Setting, and Issues

Spatial planning in Indonesia is classified into several bases, namely area system and urban, function of area, administrative area, activities, and strategic value. Related to strategic value, a term “strategic area” arises which means that this area is prioritized due to its very important influence. In the spatial plan of Indonesia, "strategic value" of a region can be found in some plans, such as inside urban system, river basin, and national strategic area. Strategic areas have many perspectives and dimensions. In the national urban system, strategic value of an area is

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Peer-review under responsibility of the organizing committee of CITIES 2015
doi:10.1016/j.sbspro.2016.06.063

known as “national strategic activity center” which means that the area is designated to encourage the development of border area. So far, there are around 26 national strategic activity centers spread across Indonesia. This paper employed a case study in West Kalimantan strategic area, specifically in Sambas regency which has two border areas, Paloh and Aruk. Sambas regency was selected as a case study because it had unique condition that had two models of strategic areas, those were (1) national strategic activity center in Paloh and Aruk (also as a border area), and (2) national tourism strategic areas in Sambas district and surrounding. In this condition, one of the aims of this paper is to explore and find out the relation or interaction between two strategic areas. Specifically, we decide Sambas district as a regency capital city (tourism strategic) and Temajuk village (border and strategic activity center) as detailed case study.

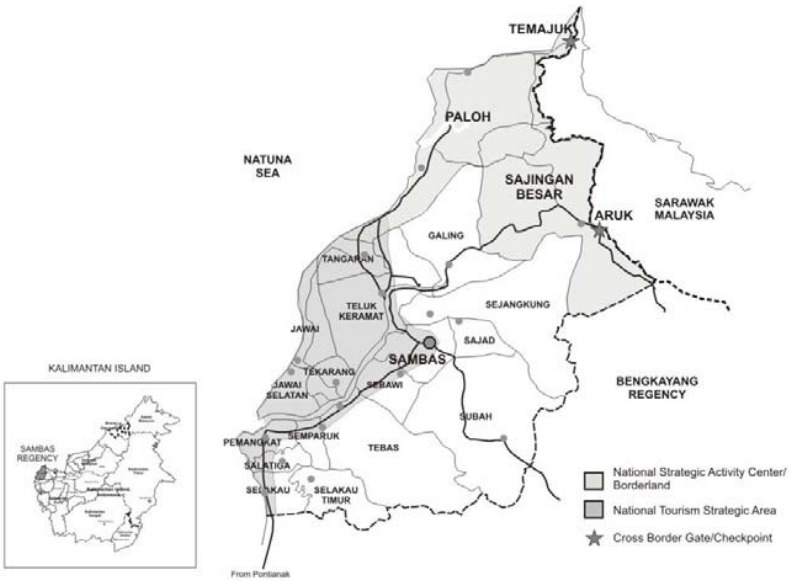


Fig. 1. Sambas Regency (Kabupaten Sambas)
Source: Author, 2015

From the interaction among strategic areas, it is not infrequent to find “melting points” between “networks" that influence each other in several aspects, such as economy, social, environment, cooperation, etc. Developed areas sometimes become a “magnet” for less developed areas which might create imbalanced mutual relationship or interaction among areas. One of the approaches that can be used in exploring the interaction among areas is network analysis. This approach is popular with representation of the relationship between links and vertices which is described by graph (Rutherford, 2007; Iacobucci in Wasserman and Faust, 1994). The advance of network analysis is also known as “metaphor” (Clarke, 2009), where network analysis has entered into various fields of science including urban planning. A city/urban area may consist of several series of network systems/components (Beaureagrd in Albrechts and Mandelbaum, 2005), thus, the term of urban networks describe network of city which has function in the global economy and infrastructure (Clarke, 2009). According to Erickson (2012), there are three different types of network (as metaphor), those are technical, transactional, and socio-technical. Dupuy (2008) also mentions that there are also levels of networks in terms of diagrammatic exposition on network level within the city/urbanism and three criterions. He distinguishes three interacting levels of operators, including technical networks, functional networks, and network user. In addition, urban network is characterized by three principle criteria, namely topological, kinetic, and adaptive.

As we highlight the adaptive criterion, the global changes occur; the adaption should be carried out. The process of change continues to occur and sometimes becomes faster, thus, creates new possibilities that need to adapt with (Graaf, 2012). In urban network concept, there is what so-called adaptive criterion, which includes the notion of multiple choices with regards to connections (Dupuy, 2008). Network should be able to modify its own structure of

nodes and links, and it should adapt with various changes and changing needs and desire of its users (Wandl et al, 2012). From several illustrations above, this paper tries to explore the interaction of "urban networks" in the two strategic areas. In each area, the trend of interaction or relation between "actors" (people) and "locations" (places) will be explored. A wider scale of interaction (between the two locations) will be subsequently conducted. This paper also tries to explore adaptive concept that would be able to accommodate the existing networks as well as the needs of each area to develop.

2. Snapshot of Concept

According to the policy terms, strategic area is defined as an area in which its spatial arrangement has been a priority in consideration to national importance related to national security, economic development, socio-cultural, high technology, and environment protection. In some academic discussions, strategic (area) may be defined diversely. Adopted from Klyuchanskya (2011), strategic area is an important location or target of cooperation (alliance). Meanwhile, according to Feliu et al (2007), strategic area is a prestigious, important, and rich place. When associated with planning, strategic can be defined as selective and oriented (Albrechts in Healey, 2009).

Generally, the network concept is based on a relationship between entities such as organization or people (Scott, et al. 2008). Scott also states that the properties of network studied by researchers are related to the structure of these relations which provide a means of visualization sets of the relations and simplify them (Scott and Cooper, 2007). A very familiar representation of network is a drawing in which a number of points are connected by some lines; a graph theory, a model to describe relation (Scott, et al. 2008). It is supported by Iacobucci (in Wasserman and Faust, 1994) who argues that a graph consists of two sets of information: a set of nodes and a set of lines. From those sets of information, an observation on the number of interactions may be carried out as well as on the valued relation between actors. Network analysis can be characterized into several contents, such as transaction, direction, structural, centrality, density, degree, structure optimization (Scott et al, 2008; Scott and Cooper, 2007; Pavlovich, 2003). To simplify and discover ties among members, a set of groups can be made. According to Wasserman and Faust (1994) a group/sub-group is the collection of all actors in which ties are to be measured in a more or less bounded set. It can be influenced by the mutuality, closeness, frequency, and relative frequency of the ties.

Based on the capacity to evolve over time and space, according to Alterman (1988), adaptive process can be decomposed into two components: tactical control (situation difference consideration), and situation matching (old plan and new situation are matched). The future city should be flexible and adaptive to respond to new needs and demands of its users (Petrou and Hadjisoteriou, 2014). Urban strategies should evolve through smaller scale which will outlines the uses and vision of the larger scale. Adaptive urban development is the design to anticipate and react to the changes in environment and society (Graaf, 2012). Berke et al. (2014) mention that "predict and plan" should be based of foresight, adaptation, and multiple possible scenarios in the future. Urban adaptation has to deal predominantly with the adjustment of physical structures and integration to adapt with the principles of: "adaptation – assessment – planning – implementation – evaluation". The adaptation should consider and integrate the micro needs (household level), city level, and city-regional level (Birkmann et al, 2010).

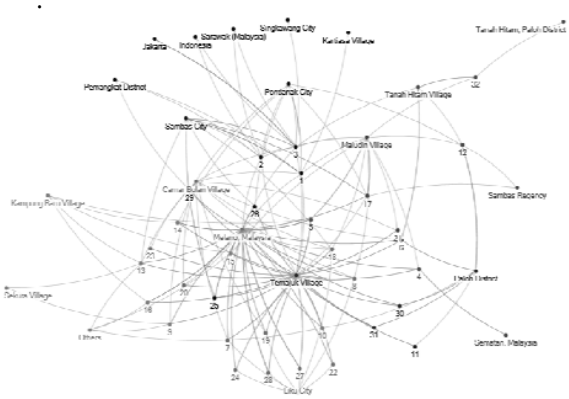
3. Methodology

The data collection was conducted in each area by distributing the questionnaires and interview. The samples were adjusted based on the population number in each location (using Krejcie and Morgan prediction, 1970). This paper explored the social and business (transaction) networks as parts of urban network. In each location, the network exploration focused on the interaction between actors (people, business unit) and places (location). By doing so, the trends of interaction, domination, and distribution were going to be found out. This paper used several indicators. To observe business network we used consumer origin, employees' distribution, development location, selling target location, and main transaction. And, we observed social network by using family distribution, frequent route, family visit, work location, daily activities, close friend, and work colleagues. After all the data were collected, all of the indicators in each of areas were structured in a form of "group" or "cluster" (using Clauset-Newman-Moore in Smith, 2010) to compare between whole networks and groups of actor. This action was carried out to see "people-places" group distribution and domination which was formed from the networks. The measurement and chart visualization was assisted by NodeXL Excel 2014 template (Smith et al, 2010). In examining the adaptive capability, literature review was used to explore the application or implementation of adaptive approach. The adaptive concept and application explored was a general concept which had similar response

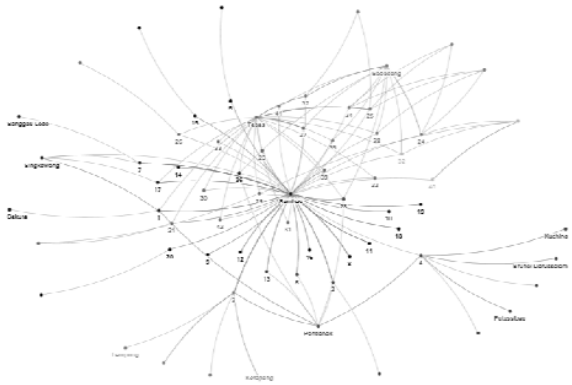
and was taken from several sector discussions, such as planning, management/governance, environment, climate change, infrastructure, etc.

4. Findings and Discussion

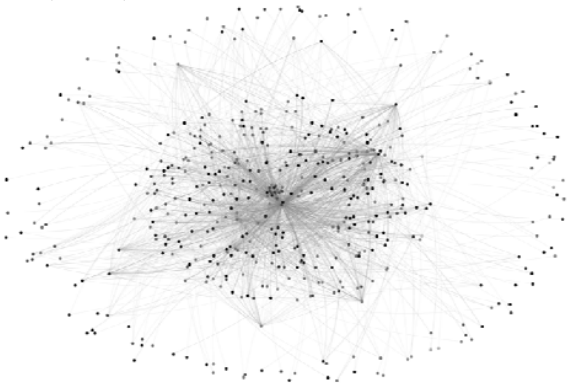
If seen from the whole structure of network, generally, the business network orientation in Temajuk (as a national strategic activity center) has ties with areas outside Temajuk, especially with advanced areas/cities such as Sambas district, Singkawang, and Pontianak as the province capital city. Besides, the business network in Temajuk is also oriented to the neighboring country as well as within the village itself. Meanwhile, the existing networks' interaction in Sambas district (as tourism strategic area) shows that the business network is generally oriented to the district itself. In addition, other networks flow to other areas and are more oriented to other advanced areas/cities such as Tebas, Singkawang, and Pontianak. The business network in Temajuk tends to be distributed, on the contrary, the network in Sambas seems to be concentrated



a. Business network in Temajuk
Location (area) with highest degree (in a whole network): Temajuk (Incl. Camar Bulan, Maludin, Sempadan), Melano (Sarawak), Sambas, Pontianak, Liku-Paloh, etc.



b. Business network in Sambas
Location (area) with highest degree (in a whole network): Sambas, Tebas, Sebedang, Pontianak, Singkawang, Sebawi, Sempalai, Pemangakat, etc.



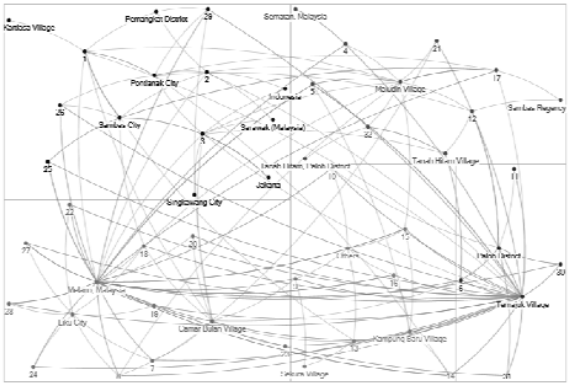
c. Social network in Temajuk
Location (area) with highest degree (in a whole network): Temajuk (Incl. Camar Bulan, Maludin, Sempadan), Melano (Sarawak), Liku, Jawai, Sambas, Pontianak, Singkawang, Sekura, Tebas, Pemangkat, etc.

d. Social network in Sambas
Location (area) with highest degree (in a whole network): Sambas, Pontianak, Singkawang, Dalam Kaum, Pemangkat, Tebas, Tumuk Manggis, Tanjung Bugis, Kartiasa, Saing Rambi, etc.

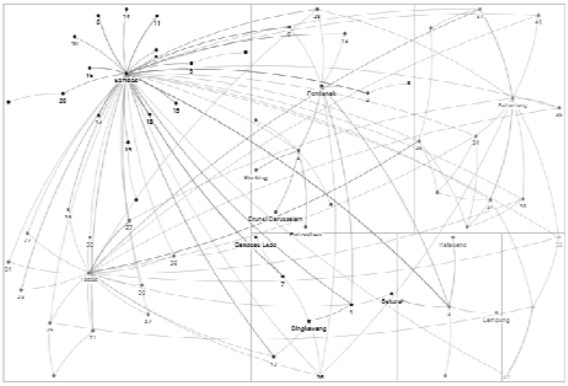
Fig. 2. Networks in Strategic Areas
Source: Analysis, 2015

Related to the social network in Temajuk, the existing ties tend to be oriented inside the village itself, especially distributed among three sub-villages of Temajuk, namely Camar Bulan, Maludin, and Sempadan. Interestingly, there is also a bond formed with the neighboring country: Melano, Sarawak-Malaysia. Furthermore, corresponding to tourism strategic area (Sambas district), the networks ties are more varied and spread. The networks in Sambas do not tend to concentrate in one place/location. Several important/dominant places are distributed in Singkawang, Pontianak, Pemangkat, Jawai, and some villages/sub-villages of Sambas district itself. On the contrary, the social networks in Temajuk tend to be concentrated. The network interactions of the two strategic areas tend to be imbalanced (in one-way direction), in which the network orientation of each area tends to be oriented to the other areas with more advanced development, towards the province capital city. This condition makes Temajuk not accessible from Sambas and other areas, in contrast, Sambas tends to move away from Temajuk.

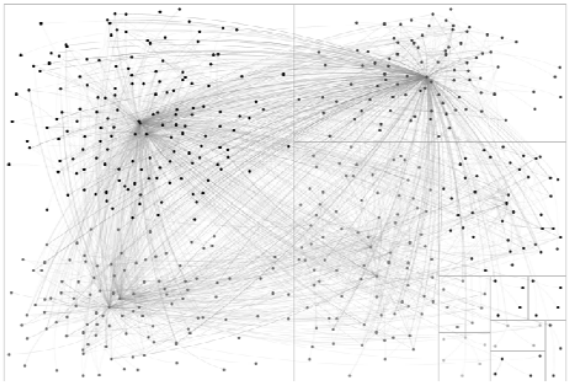
After exploring the network as a whole, we also observed the whole network explored as a group/cluster on the basis of influence. It is found that several groups are interconnected, whether or not they are dominant locations. The distribution of the networks is as follows:



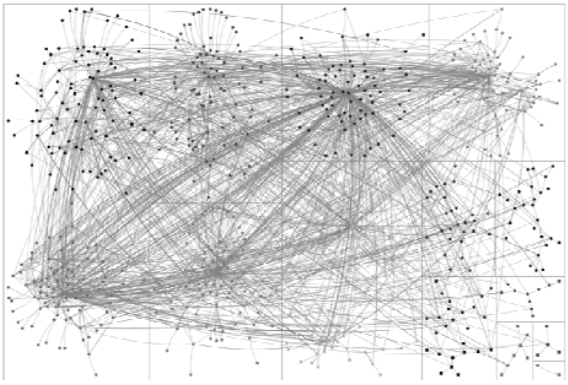
a. Business network group/cluster in Temajuk
Number of Group: 5



b. Business network group/cluster in Sambas
Number of Group: 7



c. Social network group/cluster in Temajuk
Number of Group: 12



d. Social network group/cluster in Sambas
Number of Group: 16

Fig. 3. Network Group/Cluster in Strategic Areas
Source: Analysis, 2015

When the locations (areas) are "synchronized" with the distribution of groups which have "influence" to one another, the locations with the highest degree (dominance) in the whole network is not necessarily to be dominant (rank 1). It is caused by the fact that some of “important” locations with high degree (or low degree) have a tendency to have relationship and reciprocal influence among each other. With the establishment of group/cluster among people and places, it is discovered that in general, the important/dominant locations are tied with other locations. In this condition, the agglomeration of “low degree” locations with “high degree” locations could become

a new dominant group (if seen from the total number of edges and vertices) because there are linkages among these areas. With the formation of the group/cluster among people and places, it is known that the dominant areas are also tied with several other areas. The agglomeration of several areas which are not too dominant could become a "regional cluster" that have dominance degree (viewed from a total number of edges and vertices) because of its linkage. From the structure of a whole network or as group/cluster, the development of certain areas may be considered a link between locations (areas) within a group, as well as dominant locations in the overall network.

In regard with the imbalance “interaction” between areas (each area is represented as rural – urban and specific strategic area), as well as the role of each area in the network structure (as a whole network or group/cluster), evolving and flexible capabilities (adaptive) of the network is required so that the direction of the development will be spread more evenly and can accommodate faster the rapid change of the people or the areas to fulfill their needs. From our review, there are several general applications or implementations regarding adaptive approach which is described below:

Table 1. Adaptive Application/Implementation

No	Adaptive Application/Implementation	Inside Author (s)
1	Using benefit-cost, cost effectiveness and multiple-criteria procedures, document and needs analysis	Smit and Wandel (2006)
2	Data basis and regression to calculate potential future condition	Ruth, Bernier, and Jollands (2007)
3	Comparing the forecast with the existing condition, key system parameters, scenarios – back casting - contingency planning – monitoring - experimentation, and diversification.	Kwakkel, Walker, and Marchau (2010)
4	Buy in and goal setting – model building	Jacobson, Hughey, Allen, Rixecker and Carter (2009)
5	Repeat monitoring and evaluation, selecting best options, clearly identifying and using criteria for indicator selection	Moore and Hocking (2013)
6	Past – present – future perspective, historical paths conditions	Hetz and Bruns (2014)
7	Situation difference identification – situation matching	Alteman (1988)
8	Identification of new needs, demands of its users	Petrou, Hadjisoteriou (2014)
9	Identification of opportunities, engage in and support new ideas, set a goal, improving capacity	Kropp, Zolin, Lindsay (2015)
10	Integration of different knowledge, assessment of cross scale specific measure, identification of potential conflicts	Birkmann, Garschagen, Kraas, Quang (2010)
11	Annual survey, planning, operation and preparedness, collaboration	Dis, Dymen, Lange (2010)
12	Develop determinants of adaptive: economic resources, technology, information and skills, infrastructure, institution, equity	Juhola, Peltonen, Niemi (2012)
13	Sector scale/macro scale analysis, domain analysis, risk and cost-effective,	Hallegate, Corfee-Morlot (2011)
14	Urban development plans, preparing dedicated adaptation plans, preparing adaptation objectives, development standard	Matthews (2011)
15	Goal for specific plans, prioritize, design and experiment, identify indicators and metrics, monitor and evaluate	Ahern, Cilliers, Niemela (2014)
16	Reassessment, corrective actions, defensive actions	Marchau, Walker, Duin (2008)
17	Modeling and monitoring, determining appropriate systems, interdisciplinary, stakeholders involvement	Kato and Ahern (2008)
18	Identification of rural-urban, economic flows, resources flows, socio-cultural relations	Ricci (2011)
19	Forecasting, simulation, planning, trend extrapolation, scenarios	Ratcliffe (2011)
20	Characterize the state or condition of the targeted area – analyze related planning – function zoning – prediction – planning objective and countermeasure – implementation – public participation	Fang, Zhang, Hong (2006)

Source: Compiled from Several Authors

Based on our interpretation, there are two types of adaptation (from IPCC in Berry et al., 2006): autonomous or spontaneous and planned. Autonomous occurs at the level of individuals to choice, while planned adaptation refers to adaptation which is interfering. If seen from the current conditions, the orientations that exist tend to be formed on the consideration of the existence of infrastructure, ease of access, and need fulfillment which are "spontaneous" form of a network and interaction. Border area (Temajuk village) as one of the villages inside the strategic area tends to have the orientation that leads to the surrounding areas as well as neighboring country that have closeness and ease of access. However, in accordance with the national spatial plan, the national strategic activity center in Sambas regency is concentrated in Paloh district and Aruk in Sajingan Besar district, and so far, there has been no significant development progress in each area as the assignment of the areas to be urban center, node of transportation, and economic development. In fact, the "spontaneous adaptation" conducted by Temajuk people

should be taken into consideration on how to improve the cooperation and coordination with neighboring country to provide certain access that can provide ease among the people and between the countries. This is important because the infrastructure of access and other supporting facilities (e.g. strategic road, bridge/ferry, electricity, communications, etc.) to support the areas to be an urban center are still limited, so the public access to the main cities becomes difficult and distant. Based on these conditions, the trends and opportunities to interact with the neighboring country are factually wide-open.

In Sambas district (as tourism strategic area), the suitability of orientation with the national urban system (in national spatial plan) can be obviously seen. As the regional center of activity, Sambas district has a function to serve several cities/regency in scale of province. Upon this condition, the relationship between Sambas district and the province capital city (Pontianak) and with other related areas/cities is assumed to have been planned (planned adaptation). By looking at the existing network, it is proven that the orientation activities in Sambas district lead to the province capital city and are variously distributed in many places/locations. The economic activities in Sambas district have been formed and focused on the district itself as the consequences of being regional center. However, the interaction with Temajuk village is still very low which can certainly make the distribution of development from Sambas to Temajuk hampered. Referring to the conditions above, the spontaneous adaptation from Temajuk village and the planned adaptation from Sambas district are needed to consider the establishment of more adaptive network.

According to Lu et al. (2013), as they quote from several authors, the regional economic growth always depends on one or several pole centers, such as industrial agglomeration, transportation cost, infrastructure advance, and sustainability factors. Of the strategic area conditions, ease of transportation and the existing infrastructure condition tend to be the major problems. To support the adaptation of the existing networks, the needs of each area as well as their adaptations need to be considered while keeping new network opportunities. It is then concluded that (network) planning activities in strategic areas need to consider new opportunities and accommodate changes with regard to the measures involving:

1. The strengthening of the data base that can provide the latest information, comparison, and future forecast
2. Benefit-cost-risk analysis on the new development or assessment
3. Continuous identification of potential conflicts between existing network plans and “spontaneous” networks which are formed
4. Creation of priority, adjustment of situation and scenarios, and implementation of corrective actions on the existing plans
5. Involvement of public as well as other stakeholders.

5. Concluding Remarks

From the exploration that was carried out, it can be seen that networks in national strategic area have their specific characteristics. In the border area as national strategic activity center (Temajuk village) the economic and social activities tend to be oriented in its own area, neighboring countries, and move to the areas outside leading to the areas/cities which are more advanced. However, the existing networks in Sambas tend to move to many places and head towards the province capital city (Pontianak). From the perspective of interaction (one-way interaction), Temajuk tends to be oriented to Sambas, while the “quantity” of Sambas networks tend to be minimum toward Temajuk. In this condition, the networks in Temajuk are more spontaneous to adapt with their limitations, while those in Sambas are more planned due to their functions (as regional activity center) and infrastructure. To distribute more evenly the development outcomes, adaptive approach can be emphasized by strengthening the database, doing benefit-cost-risk analysis, identification of potential conflicts, making priorities, scenarios and corrective actions, and involvement of public.

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