

# Implementing Scale-Free Network and Hierarchy for Developing Inclusive Business

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*Following the 1997 financial crisis in Asia, Indonesia has experienced uninterrupted growth. This growth has succeeded in reducing poverty and creating a new middle class. Nevertheless, this growth has also resulted in widening the gap between the richest and poorest, and inducing inequality among regions. Poverty reduction efforts in the last few years have suffered and leveled off, even worse, almost no poverty reduction has been attained in 2014. Therefore, the benefits of development likely can be utilized only by people who have power, both economically and politically. In addition, rural and remote areas still lag urban areas due to lack of business activities and good infrastructure.*

*Inclusive Business is one way to include people who have been excluded in development process through business activities. In general, most inclusive business involves large companies integrating the process of poverty reduction into their value chain. In this paper, the role of local small and medium enterprises is proposed as perpetrators of inclusive business. Modeling inclusive business is carried out using free scale network. based on the establishment of hub. Hub is formed naturally because the new node tends to connect to the node that has the largest network. The hub can be an individual, a small business unit, or an institution. New institutions can be created. Further, hierarchy is used to include smaller units (holon) into larger units (super holon), without the need for both to be identical.*

*Posdaya (Movement of Family Empowerment) and contract farming can be regarded as inclusive business if dealing with business process. Posdaya involve people directly. Yet, the Posdaya movement still lacks a systematic model, whilst contract farming is very market oriented and mostly directed by corporations. Therefore, contract farming is less democratic and farmers have less freedom since they are bounded by the contract for a specified time.*

*Graph mathematics, social network analysis, and artificial neural network are used in this paper. Previous work indicated that network in Posdaya movement following free scale networks, with hub mainly conducted by formal leader. The role of hub can be leveraged by introducing new institution or revitalized the existing institution. In addition, farmer with large land ownership is not suitable to be appointed as multi-part representative, who will link the existing holon with super holon. This task is more appropriate to be carried out by people or farmer who has off farm activities. Based on this finding, holonic model for small and medium enterprise is proposed which is based on communality.*

**Keywords:** free scale network, hierarchy, holon

## I. INTRODUCTION

Following the financial crisis in Asia in the late 1990s, Indonesia experienced steady positive economic growth. High commodity prices followed by high consumer spending contributed to the economic recovery in Indonesia. Poverty declined to close to 10 percent of the total population in 2015, with poverty in the rural areas slightly greater compared to that in urban areas. Yet, if we look more deeply, the benefits of economic growth are biased toward the rich. In 2002, the richest 10 percent consumed as much as the poorest 42 percent combined, whilst in 2014, they consumed as much as the poorest 54 percent combined. In 2015, approximately 45 million people (18 percent of the richest people) enjoyed a high life quality, with this segment growing 10 percent annually. Between 2003 to 2010, consumption per capita for the top of the 10 percent of the population increased by more than 6 percent (after the impact of inflation has been considered) whilst 40% of the poorest population only experienced 2 percent growth (World Bank, 2015). Thus, Gini ratio increases from 0.35 in 2008 to 0.41 in 2015 (BPS, 2016).

For poorer social classes, entrepreneurship is often the most realistic alternative for entering formal employment due to lack of their educational qualifications, which often acts as a barrier to entry the formal jobs. Furthermore, entrepreneurs are typically held in high regard in local society (Widjaja and Tan, 2013). Therefore, the number of micro and small scale enterprises are abundant in Indonesia (3,385,851 micro enterprises and 283,022 small scale enterprises in 2015) (BPS, 2016). These enterprises can contribute to alleviating poverty in Indonesia. The BBC survey also suggests that entrepreneurs in Indonesia are the most optimistic among the G20 members, particularly in terms of the regulatory environment, access to funding, and the availability of coordinated support. All this bodes well for entrepreneurs (Widjaja and Tan, 2013). Yet, the problem is how to include the currently excluded persons or groups into the development. These people and groups are usually excluded by system because of their status. The poorest in any society are often bypassed by economic development as they lack the skills or know-how to build a route out of poverty (Bandiera et al, 2009).

## II. SOCIAL CAPITAL

Social capital is a multidimensional concept which currently does not have a unique definition commonly accepted within the social sciences. However, many definitions of social capital

mostly consist of social networks, interaction of the agent based on norm, and trust for mutual benefit (Asadi et al, 2008). Sociologists focus on the role of social capital in improving narrow groups' ability to pursue shared objectives, political scientist focus on the external or public returns to social capital, whilst economists only address the role of social capital in improving a single agents' ability to pursue their interest. This is because economics is strongly dominated by the neoclassical economics theories, which is individualistic in nature (Kusdarjito, 2012). Despite this variability in defining social capital, there is a growing consensus that social capital stands for the ability of actors to secure benefits by membership in social networks or other social structures (Grootaert, 1999). Valentinos (2003) also mentioned that social capital was defined as the shared knowledge, trust, and culture embodied in the structural forms of networks and other stable inter-agent relationships. Yet, Glaeser et al (2001) stated differently in which decisions to invest in social capital are made at the individual level, not at the community level. Without a definition of social capital that starts from the individual level, its formation cannot be understood.

The components of social capital are, bonding, bridging, and linking. Bonding and bridging are horizontal social capital, whilst linking is vertical social capital. Bonding and bridging have different characteristics. Bonding mostly relateds to tighter and narrower networks, whilst bridging is more flexible and focuses on broader networks. Linking relates to the vertical social capital, in which stronger linkage of social capital indicates the influence of government and/or markets to the society. Strong bridging followed by strong linking will result in a more democratic society, whilst strong bonding and linking will result in autocracy and oligarchy. Weak linking but strong bonding will result in primordialism and high conflict, even leading to catastrophe. Weak linking and strong bridging will create nihilism in society (Kusdarjito, 2008). Bonding is suitable to generate in-group solidarity, whilst bridging is more inclusive, outward looking and involving people from the outside group. Woolcox (2002) said that bridging is essentially a horizontal metaphor, implying connections between people who share broadly similar demographic characteristics, irrespective of how well they know one another.

Meanwhile, based on their social structures, social capital can be seen in micro, meso and macro level. At the macro level, social capital includes institutions such as, government, the rule of law, and civil and political liberties. At the micro- and meso-levels, social capital refers to the networks and norms that govern interactions among individuals, households, and communities. Such networks are often (but not necessarily) given structure through the creation of local associations or local institutions (Grootaert, 1999).

Social capital also can be used to solve common economic problems such as, the free rider problems in providing public goods, or using trust when an explicit contract is not available. Moreover, improving of social capital can pave the way to integrate environment and people to alleviate poverty and receive sustainable development (Asadi et al, 2008). Therefore, involving social capital in developmental theory can be explained from the perspective of a social network. The problem is how to integrate the finding obtained from the social network

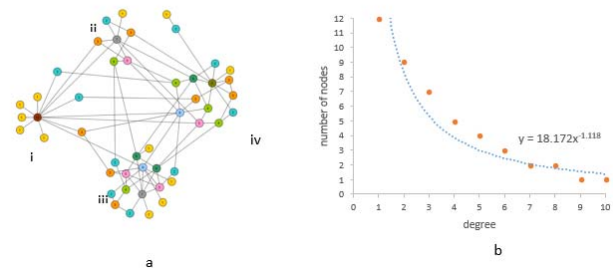
with the economic performance affected by inclusion of social capital (Kusdarjito, 2012).

### III. SOCIAL NETWORK ANALYSIS

Social Network Analysis (SNA) is based around the idea of seeing social relations in formal terms as patterns of points (nodes, vertices) and lines (edges, arcs) in a mathematical space with formal properties that can be analyzed with precision. The mathematics behind social network analysis is graph theory (Crossley et al, 2009). Complex networks describe many social, physical, and biological systems (Ahmed et al, 2005). Societies, are networks of people linked by friendships, familial relationships, and professional ties (Barabási and Bonabeau, 2003).

Previously, it was assumed that complex systems were wired randomly together, a hypothesis that was broadly adopted by sociology, biology, and computer science (Barabási, 2009). The scale-free network model proposed by Barabási and Albert (1999) explains the existence of hubs and cliques in terms of two features of network evolution: growth and preferential attachment which are not random. The two basic mechanisms of growth and preferential attachment will eventually lead to the system's being dominated by hubs ie. nodes having an enormous number of links. (Ahmed et al, 2005).

Hence, a scale-free network is the network whose nodes aren't randomly or evenly connected, but includes many "heavily-connected" nodes, known as the hubs, which are responsible for shaping the way the network operates. A scale-free network doesn't have a fixed size because of preferential attachment, which can grow with time (Barabási and Bonabeau, 2003; Barabási. 2009). As new nodes appear, they tend to connect to the more connected nodes, and these popular nodes thus acquire more links over time than their less connected neighbors. The "rich get richer" process will generally favor the early nodes, which are more likely to eventually become hubs (Barabási and Bonabeau, 2003; Barabási. 2009). Therefore, in a scale-free network, there is a high probability that many transactions would take place through one of the well-connected nodes, known as the hubs of the network (Tolba, 2007). Starting with a small number of nodes, like the internet in 1990, new nodes are added over time. Older nodes therefore have a greater probability of acquiring new links. Furthermore, already well-connected nodes are much easier to find and will in consequence acquire more new links



**Figure 1. Typical Scale Free Network**

Figure 1 shows typical scale-free network. As shown in Figure 1a, many nodes have limited connection (21 nodes have

less than 2 connections), whilst only two nodes have nine and ten connections. Further, from Figure 1a, four clusters can be identified ie. cluster i, ii, iii and iv, in which cluster i represents the presence of one dominant node, connecting cluster i to the other clusters, either directly or through other nodes as bridge. Cluster ii is a sparse cluster, but a node with high degree (hub) in the cluster is not as dominant as in cluster i. Other member of the cluster ii also has direct connection to other clusters. Cluster iii is a typical high density cluster in which many nodes have high connection within the cluster. In terms of social capital, cluster iii represents strength bonding network. In cluster iv, the network is relatively sparse compare to the network in cluster iii; yet many nodes in this cluster have many links with other nodes from different clusters. The pattern in cluster ii and iv represents bridging in social capital. The value of  $\square$  (-1.118) is exponential degree. The factor is derived by counting the number of edges per node and plotting the results by increasing degree.

Serrat (2009) identifies that social network analysis may be used for: (i) identify the individuals, teams, and units who play central roles; (ii) discern information breakdowns, bottlenecks, structural holes, as well as isolated individuals, teams, and units; (iii) make out opportunities to accelerate knowledge flows across functional and organizational boundaries; (iv) strengthen the efficiency and effectiveness of existing, formal communication channels; (v) raise awareness of and reflection on the importance of informal networks and ways to enhance their organizational performance; (vi) leverage peer support; (vii) improve innovation and learning; (viii) refine strategies.

Some terms involving Social Networks used in this paper include; *Total Degree*, which indicates total number of edges directing and emanating from certain nodes, and *Betweenness Centrality* which, measures the degree of connectedness from one nodes to the other nodes in the networks. *Betweenness Centrality* can be used to identify bridges in the network. Bottlenecks or bridges are central nodes that provide the only connection between different parts of the network. Bridges can be defined as node connecting one group (clique) with the other group (clique). In contrast, isolation represents people who are not integrated well into a group. Finally, *Eigen Vector Centrality*, it is not only looking for the degree of connectedness but also looking for the value of total degree of nodes connected to this node under observation. A Connection with a popular person is more important than a connection with an isolated person or loner.

#### IV. HOLARCHY

A holon is a whole-part construct that may be composed of other holons, but it may be at the same time, a component of higher level holons. A holon can be seen depending on the level of observation, either as an autonomous entity, or as an organization of holons. This duality is sometimes called the Janus effect. Hence, any observable unit is at the same time a whole—composed of smaller parts—and part of a larger whole. By systematically applying the whole/part conceptual relationship, or the equivalent one of container/contained, the universe appears to us as a hierarchy of holons or simply a holarchy (Mella, 2009b). Due to their Janus-faced nature, holons must necessarily be connected to the other holons in a typical vertical structure known as a holarchy, which can be viewed as

a multi-layer system (Mella, 2009a). Holarchy is a system of holons with different levels. It is a nested hierarchy of holon in which part/whole occurs simultaneously. Each higher level holon includes (as supersets) and transcends to its lower level holon. The higher level holon has emergent properties that are not found in its lower level (Sattler, 2008).

Higher level holon (super holon) can exert influence over the lower level ones. However, the higher level holon can over-dominate or even repress and alienate the lower level one (sub holon), which is pathological to the holon. Conversely, there are also a negative vertical drive, which may result in over identification which result in ascending bias such as “too much (influence) from this world (holon)” or “toward the other world” whilst the negative descending will attribute development too much “from the other world” or “toward this world” (Bowman, 2009). If a holon ceases to exist, then all the higher holon are also destroyed because they depend in part on the lower holon for their components (Wilber, 1996). Therefore, each holon must preserve and assert its autonomy; otherwise, the organism would lose its articulation and dissolve into an amorphous mass.

Rodriguez et al (2006) mentioned four roles used to describe a moderated group as an organization: Head, Part, Multi-Part and Stand-Alone. The three first roles described a status of a member inside a super-holon. The Stand-Alone role represents how non-members are seen by an existing holon. Inside a super-holon, members can play three different holonic roles: Head, Part and Multi- Part (Figure 2). The Part status represents members belonging to only one super-holon while the Multi-Part status represents sub-holons belonging to more than one superholon. Super-holons are created with an objective to perform certain tasks. To achieve these goals, the members must interact and coordinate their actions (Cossentino et al, 2008).

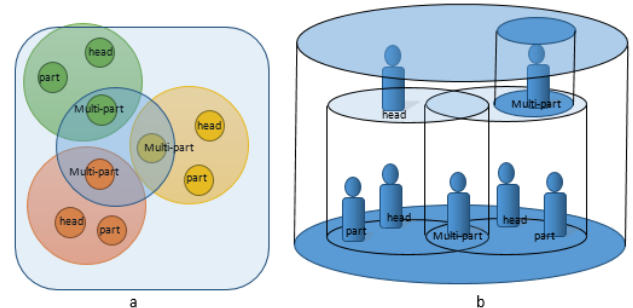


Figure 2. Holonic Roles

#### V. FINANCIAL INCLUSION AND MICROFINANCE

The old microfinance is unnatural since the old microfinance aims for an institution to sustain itself through a push toward profit. The new microfinance aims for groups to sustain themselves through the pull of social benefits (Wilson, 2002). In India, the new microfinance which links traditional wisdom rooted in the self-help model. Promoters, either field staff of NGOs, bank staff, or volunteers (often group members themselves) reach out to women, gather them into groups of twenty or fewer and encourage them to save weekly or monthly. Promoters show groups how to lend their collective savings for a variety of purposes, ranging from loans to buy a few chickens,

pay school fees, or finance emergency medical care of a child. Promoters also instruct groups to properly record saving and lending transactions. After groups stabilize and can perform a variety of group management activities, promoters link them to local banks, where they may receive a group loan. In this model, promoters organize people, motivate people, and find the poorest ones to serve—activities they do well. For them, these acts are natural (Wilson, 2002).

The world's largest NGO BRAC developed their program for reaching the ultra-poor over several years in Bangladesh. BRAC's ultra-poor program aims to economically, socially and psychologically empower the poorest women in Bangladesh through a multi-faceted intervention. Targeted women receive a combination of assets, such as cows, goats, poultry, or seeds for vegetable cultivation. The asset transfer is accompanied with skills training specific to the type of asset provided. Furthermore, a subsistence allowance is provided for the first 40 weeks following the asset transfer, with the aim of providing an opportunity for the beneficiaries to spend some time learning to use the assets to make a living out of them. The allowance enables them to supplement their income while they quit occupations they may have had and devote more time to business activities related to the transferred asset. This highly intensive subsidized element of the program only lasts for two years. Between 18 and 24 months, the beneficiaries also take part in confidence-building sessions about how to use micro-finance and are enrolled in village-level micro-finance organizations (Bandiera et al, 2009).

The intervention results indicate that after one year, the treated households still have the provided assets and their savings increased. The asset transfers are large enough to increase the wealth of the treated households. Their spending on durable goods also increased, and their business skills and health status are also increased. For the policy maker, this approach provides useful insight into social network within community, such as family ties, ties to informal insurance, and market transaction ties including land, labor market and credit markets. Other findings included, that the ultra-poor are embedded in a rich web of networks. The program creates connections between the ultra-poor and households in higher wealth classes, especially for market transactions (Bandiera et al, 2009).

In term of social capital, the above approaches are related to strengthen bonding networks in which the members are homogenous. From the perspective of the networks analysis, those approaches are forming cliques such as cluster iii in Figure 2a. Without the help of NGO, bank staff, and volunteers, their bridging capability to other networks are limited. This approach also needs intensive subsidies, especially from government. This subsidy may also come from a stated owned company, such as Pertamina oil company with FLIPMAS (science-based and art-based community services).

## VI. INCLUSIVE BUSINESS

When a pro-poor intervention depends on grants, its scale is limited by funds and donor decisions. Rather than provide the poor with financial inclusion programs, it is also possible to involve the poor in the value chain of the market, which can grow, evolve, and adapt in new markets, followed by business opportunities (BIF and IAP 2011). Therefore, it is necessary to

link low income people with existing markets for their goods and services, to continue the benefit beyond the time frame of the development project. This can be achieved in collaboration with business organizations that interact with low income people as producers/consumers in their supply chains or as employees or distributors in their firm. Also, some businesses are producing goods and services for the low-income people (Care, 2013). They generate social impacts by deliberately and directly targeting the low-income segment as part of their value proposition (de Jongh, 2013).

The term “inclusive business” was first coined by the World Business Council for Sustainable Development in 2005. The council seeks to assure that the company's growth is driven in part by their ability to be inclusive of low-income and vulnerable populations. One of the greatest contributions from business practitioners for society is their ability to open access for society such as, accessibility to goods, services, and economic opportunities. The organizations behind such business models range from small enterprises to multinational corporations, and originate from both industrialized and developing countries (Tewes-Gradd et al 2016). These approaches are expected to increase economic growth and living standard in community.

However, some obstacles that may be faced by business practitioners when involving people to improve their living standard, are governance gaps and bottlenecks in which, business practitioners fail to attain economies of scale. This may happen because most of the poor people have low incomes do not have enough assets. Even worse, they experience exclusion in formal economics.

Inclusive business differs from BRAC in Bangladesh or MYRADA in India since this approach emphasized strengthening assets, and to provide access to the formal financial institutions for the poor, which were previously excluded from the formal sectors by means of market mechanism. Inclusive business, in some respects, is very market oriented and mostly directed by corporations. Here, the roles of farmers (such as in contract farming) or people may become supplier, customers, and labor provider only.

## VII. PREVIOUS FINDING

There are some interesting findings regarding social capital in Indonesia. Social capital is measured in the form of local association as a proxy. Further, heterogeneity is measured based on the eight criteria, neighborhood, kin group, occupation, economic status, religion, gender, age and education level. Membership rises with the level of education. However, they are only slightly related to the income level. Homogenous association (bonding) is hypothesized to improve trust and share information, but they may also have similar information. Empirical results indicated that heterogeneity (bridging) rises with education and income. Meeting attendance follows an inverted U-pattern with respect to income and education. People with primary or vocational education, and those in the second expenditure quantile attend meetings most frequently. Participation in decision-making is higher for male headed than female headed households. Participation in decision-making increases sharply with the level of education and income. Hence, the poorest and least educated households participate less actively in the decision making of the association of which they

are becoming members. Voluntary organizations which are rooted from within the community are more effective than those externally imposed organizations. Female-headed households also tend to join community-initiated organizations at a greater rate compared to male headed households. Finally, households with higher social capital have higher household expenditure per capita, more assets, better access to credit, and more likely to have increased their savings in the past year. Therefore, social capital correlates positively with household welfare (Grootaert, 1999).

Other findings were derived from the case of Posdaya (an acronym for the “Pos Pemberdayaan Keluarga” or Movement of Family Empowerment). Posdaya was initiated by the Damandiri Foundation 20 years ago. The main goal of Posdaya movements is to attain MDG’s target. Basically, Posdaya is a voluntary organization and aims to coordinated program from either government or communities (structure of this sentence is a bit unwieldy). Posdaya accommodates a formal or hierarchical approach from government programs (mostly in the form of vertical social capital) and implements those programs using heterarchy (horizontal holon network). Even though Posdaya is not designed with the intention to implement holarchy and free scale network, it is basically uses both in some degree when implementing inclusive development. For instance, the Posdaya’s slogan is “small circles are encircled by large circle”, which is basically a holarchy.

Posdaya rely on the role of local institution to develop new networks, including the excluded groups either for social or economic activities. Many activities initiated by Posdaya undoubtedly provide positive impact locally, but the impact beyond their region in most cases are limited. The "bridges" in the network are not utilized to connect internal networks to external groups effectively. This due to the fact taht Posdaya is not maximize the available hub, and in most cases, it only focuses on how to promote and facilitate bonding network rather than bridging.

Motivation to do business of Posdaya members seemingly depends on their knowledge on how to attain better living standard. From Table 1, the motivation to do business of the Posdaya member is quite high. Yet, this high motivation is not followed by realization in business activities. This condition may be hampered by their lack of knowledge to do business, lack of formal networking, or lack of economic capital. The role of Posdaya is expected to fill this gap since by involving in business activities, it is expected that the Posdaya members’ living standard may improve gradually. Unfortunately, enhancing bonding social capital locally will not have a significant enough impact to improve their networks to outsiders. People who act as multi-part mostly communicated with government agency and only limited communication to the business activities.

**Table 1. Motivations to Do Business to Improve Living Standard**

Perception	Bantul			Kulon Progo		
	Knowledge on Living Standard	Motivation to do business	Doing Business	Knowledge on Living Standard	Motivation to do business	Doing Business
1. very low	0.44	-	1.33	-	1.43	-
2. low	1.78	1.78	1.78	7.14	2.86	7.14
3. medium	32.00	12.44	25.33	28.57	21.43	24.29
4. high	60.44	77.33	64.44	58.57	64.29	61.43
5. very high	5.33	8.44	7.11	5.71	10.00	7.14
Total	100	100	100	100	100	100

Source: Damandiri (2011a, 2011b)

Bonding social capital and hierarchical social network are represented by Boards’ skill to develop Posdaya and their bridging social capital are represented by the capability of Posdaya’s board to initialize cooperation with outsiders. Interestingly, board’s skill to develop Posdaya are higher (for medium and high score) than their capability to initialize cooperation with outsider (Table 2). This fact reflects that initiating bonding social capital is somewhat easier to develop than that of bridging social capital. Socio-economic condition may affect these results. If bridging social capital can be improved, it is possible that the effectiveness of the Posdaya movement can be improved.

**Table 2. Bridging and Bonding Social Capital**

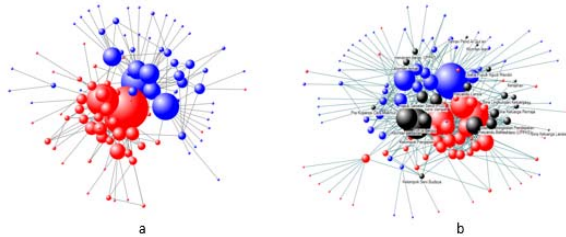
Grade	Bantul		Kulon Progo	
	Board's Skill to Developed Posdaya	Capability to Initialize Cooperation with other Stakeholders from the outside	Board's Skill to Developed Posdaya	Capability to Initialize Cooperation with other Stakeholders from the outside
1. very low	3.11	10.22	2.86	4.29
2. low	10.67	20.00	18.57	27.14
3. medium	48.44	36.89	48.57	45.71
4. high	34.67	26.67	28.57	20.00
5. very high	3.11	6.22	1.43	2.86
Total	100	100	100	100

Source: Damandiri (2011a, 2011b)

Further, social network analysis for Posdaya activity uses cases in Serut Hamlet, Bantul, Yogyakarta, Indonesia. Among Posdaya activities in Serut hamlet are, Posyandu (integrated services for family planning and health for toddler and elderly), Bina Keluarga (Family Building for toddler, teenager and elderly), PKK or Pemberdayaan dan Kesejahteraan Keluarga (Family Welfare and Empowerment). Included In agricultural activities (which are mostly initiated by the local community) are, lumbung padi (rice barn) either in family or at village level, organic farming using organic fertilizer and pesticide which is produced locally, kelompok tani (farmer group for livestock and agriculture), P4S (Pusat Pelatihan Pertanian dan Pedesaan Swadaya, or Centre for Agricultural Training and Rural Self Sufficiency), UPJA (Usaha Pelayanan Jasa Alat Mesin Pertanian, Rental Services for Agriculture Machinery and Rice Mill) and kebun bergizi (backyard sustenance food program). Included in economic activities (mixed from government or local initiative) are, cooperation, rubbish bank (handicraft made from inorganic rubbish) and wood crafting. Other activities include PAUD (pre-school education), Quranic recitation, and Karang Taruna (youth organization). Many of these activities are related to each other, and people may become a member of

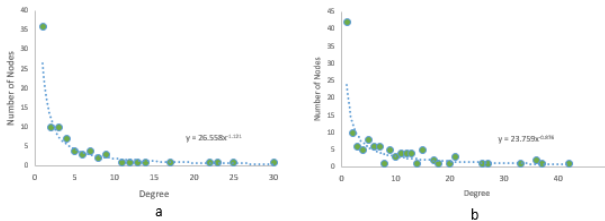
more than one activity in which Posdaya becomes superset for all these activities (Kusdarjito and Suryantini, 2011).

Figure 3a shows that only a few people have high value of total degree. This indicates the presence of hubs in the network. Yet, high total degree in Serut Hamlet mostly related to the local elites, such as the hamlet head and his wife. In addition, total degree in the female group (red nodes) are greater than in male group (blue nodes). As mentioned by Grootaert (1999), female groups are more extensive in forming bonding social capital, especially bonding for organizations which are rooted from within the community. With the presence of Posdaya (black node) in Figure 3b, total degree in the female group becomes more evenly distributed. Thus, the dominant role of the elite in the female group also decreases.



**Figure 3. Total Degree (Kusdarjito, 2012)**

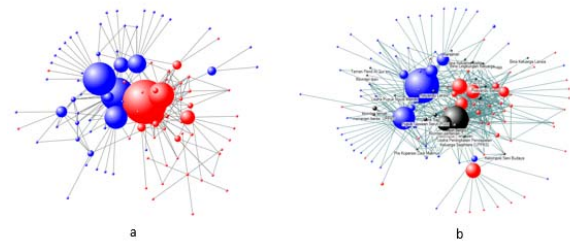
This is also indicated by the decreasing steepness of the exponential curve as shown in Figure 4b compare to that in Figure 4a. Therefore, the role of hub can be leveraged by introducing new institution or revitalizing the existing institution by adding more networks and hubs.



**Figure 4. Exponential Curve**

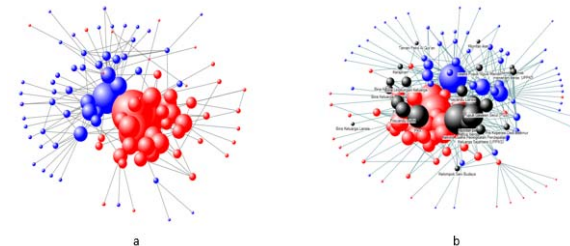
Figure 5a shows the degree of *Betweenness Centrality* for each person without Posdaya, whilst Figure 5b shows the degree with Posdaya. Without Posdaya, the high values of *Betweenness Centrality* in the female groups are dominated only by two women, whilst for the male groups is distributed more evenly to many men. With the presence of Posdaya, the role of these two women disappeared, embedded into the Posdaya networks. By means of Posdaya, people can communicate more directly without the need of middle men. Yet, the network for the female groups are more horizontal or it occurs at the same holon. For the male group, the opposite direction is happened. The role of the hamlet head become more dominant, because he becomes the hub for many Posdaya activities and he also becomes representative for hamlet to the outside institution (he becomes multi part to the other holons or super holons). This also indicates that vertical connection to superholon, mainly government institution or NGO, mostly is carried out by hamlet

head. However, connection with business activity is weak because of lack networks.



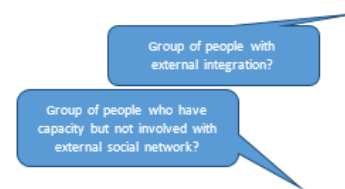
**Figure 5. Betweenness Centrality (Kusdarjito, 2012)**

Further analysis shows that *Eigen Vector Centrality* decreases with the presence of Posdaya. Posdaya activity lowering the gap between the leader with high total degree and people with previously have lower total degree because Posdaya leveraging hierarchical structure to be more horizontalize (this sentence may need to be restructured I found it a bit halting). This condition is more obvious in the female groups than male groups (see Figure 6a and 6b).



**Figure 6. Eigen Vector Centrality (Kusdarjito, 2012)**

Figure 7 and Figure 8 represents results from *Artificial Neural Network* analyses. The learning process used in the analysis is back-propagation. In Figure 7, the y-axis represents yearly spending, the x-axis represents yearly income represented in ordinal scale and z-axis represents involvement in Posdaya activities. Figure 7 shows people with high income and small spending are more involved in Posdaya activities, but it does not apply for people with high income and high spending, as they are less involved in Posdaya activities. They are therefore more independent.



**Figure 7. Relation between Income (x) and Yearly Spending (y) to Posdaya Involvement (z) (Kusdarjito, 2012)**

Although the relation is not linear, people with larger land ownership and high income are more involved in Posdaya activities, whilst people with smaller or no land, and small income are less involved in Posdaya (Figure 8). This condition indicates that exclusion still exists, even with the presence of Posdaya. Moreover, people with smaller land holdings and high income are also less involved in Posdaya activities.



**Figure 8. Relation between Income (x), Land Ownership (y) to Posdaya Involvement (Kusdarjito, 2012)**

#### VIII. RETHINKING INCLUSIVE DEVELOPMENT

Financial Inclusion basically promotes bonding in the community. Therefore, the impact of financial inclusion may experience leveling off shortly after the program is ended. This situation may cause financial burden at the macro level due to high non-performance loans. The financial inclusion sometimes does not consider how to make linkage with external groups, either as other holon (networks) or super holon.

Inclusive business, on the other hand, tries to embed directly excluded people into market mechanisms through the value chains. The danger from this approach is that previously excluded persons can become part of the sub-holon owned by business. As mentioned before, higher level holon (super holon) may exert influence over the lower level one. However, the higher level holon can over-dominate or even repress and alienate the lower level one (sub holon), which is pathological to the holon.

Following free-scale network, all members of sub holon do not necessarily have connection with super holon. Only a small proportion of the members acts as multi part or bridging. People with high income or education level usually have more extensive networks to the outside networks or super holon.

Meanwhile, results from the Posdaya also indicate that capability to initialize cooperation with outside holon (network) is only mediocre. Although the motivation to do business is high, it is not followed by real action to do business. The finding from the Artificial Neural Networks also indicates that actors (person) who have non-farm income groups are less involved in Posdaya activities. In addition, Posdaya movement in most cases also were trapped in an empowering bonding network rather than developing a bridging network. Because bonding networks are usually local and may create cliques, it could not be expected to increase welfare quickly, even though the social benefit of the groups increases. This may create a large gap between the poor and the rich at the national level, as indicated by Gini ratio.

Borrowed (don't think that borrowed is the right word to start with here) the idea from the people in Pandowoharjo, Sleman, Yogyakarta, they disagree with approaches in which excluded people (especially the poor) are put in the same groups with

other poor people because they will never learn how to be entrepreneur, how to access available resources, how to take opportunities outside the groups, and how to work effectively to improve their living standard. Although the skill can be trained to the poor people such as in India or Bangladesh, they can be empowered by putting them into existing business in the local community. Therefore, they become a member for local holon as a 'part'. They can also make association, such as cooperation or formalized micro-enterprise groups acting as super holon with consists many people or micro enterprises. Further, local micro enterprise may become sub holon for small enterprise, either located in the same or outside the region. Therefore, inclusive business should follow holarchy structure.

Hence, the contribution of the government or large business, if needed, is building and promoting holarchy for the local micro-enterprise or cooperation and create value chain to initiate and empowering local business by identifying, promoting and creating multi-part agents in the society until no structural holes exist. It seems better if financial inclusion is provided only in the early program or in case no local micro enterprise is available. Thus, inclusive business is carried out by local micro or small enterprise, which are connected to large business entities. In Pandowoharjo, it is carried out by local furniture manufacture, batik painting, village tourism, garbage bank in which most people are engaged actively. These activities also connected to the value chain from the outside of the region.

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