

Brain Gain Actors: Farmers' Regeneration in Indonesia

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ABSTRACT This study examined the potential of brain gain as an alternative approach to regenerating the agricultural sector, based on the potential actors, obstacles, influencing factors and stakeholder analysis. The methodology used includes a literature review and statistical research, and the primary data were derived from brain gain actors. In addition, the collection process required the use of snow ball sampling, and was further analysed with descriptive statistics as well as linear regression. Stakeholders were identified using in-depth interview and classified in an interest-influence matrix. The results showed the brain gain actors to have young and formal education backgrounds as progressive farmers for agricultural extension partners. However, the pull factors, including higher income, better employment environment, guaranteed future, individual freedom and political stability significantly affected the interests to perform agricultural business in rural areas.

INTRODUCTION

The slow regeneration of farmers and potential threat to food sovereignty is caused by low interest in the agricultural sector. This sector is crucial in developing countries for economic growth support, poverty rate reduction, and contribution to rural community revenue (Robbin 2011; Sertoglu et al. 2017). The lead players known to contribute significantly to production globally are farmers and the respective families (Graeub et al. 2016). Also, small-scale household farming sectors facilitates economic support and environmental sustainability (Chappell et al. 2013).

Approximately 60 percent of global youths reside in Pacific Asia, and 70 percent are involved in rural agriculture. However, several Indonesian youths prefer migration to the city or overseas, rather than working in the sector. This is considered unfortunate, risky, and attributed to lack of governmental support, including infrastructure, educational curriculum, and related institutions (Asian Farmers Association for Sustainable Rural Development 2015). The 2018 Census Agricultural Survey by Indonesian Central Statistics Agency shows among 27.68 million farmers, 64.20 percent, 35.98 percent and 13.81 percent are above 45, 55 and 65 years old respectively.

The problem of agricultural regeneration is important because the human resources are dominated by older generation with low assessment, while the younger generations exit because of brain drain (Setiawan et al. 2015). The farmers and extension workers have been exposed to the quantity and quality of this challenge, from the decentralization era. This is characterized by the increase in elderly actors, and a deficiency in quality personnel (Wulandari 2015). The relationship between brain drain and gain is paradoxical, as high skilled migration brings the benefit of brain gain (Kone and Özden 2017). This concept was initiated and eventually became popular around 1990, in the form of a collective approach or program to entice professional personnel back to the country. The impact in the past decade has contributed to the regeneration of sustainability, therefore the implementation of this policy in all sectors is recommended (Jalowiecki and Gorzelak 2004; Hall 2005). The potential of brain gain towards agricultural sector regeneration has been overlooked by several previous studies, while interests in agriculture is getting higher in.

Objectives

The main objective of this research is to analyze the potential of brain gain actors as an al-

ternative for agricultural sector regeneration. These include prospective progressive farmers and agricultural extension partners with limitations in terms of quantity and quality. The study attempts to answer questions on:

- ♦ The potential brain gain actors in the Indonesian agricultural sector
- ♦ The obstacles against the agricultural sector regeneration through brain gain
- ♦ The factors influencing the brain gain actors decision to return home and the stakeholders regulating brain gain policies

Literature Review

The earlier literatures (Gibson and Mckenzie 2012; Schiff and Wang 2013; Böhme 2015; Hasanefendic 2017) indicate brain gain is human migration comprising:

- ♦ Joint ventures programs or projects towards a reclaim of professional and educated personnel back home.
- ♦ Alteration of brain drain actors influences in decision-making from advanced countries to return home.
- ♦ The return of educated and skilled workers from advanced countries to their developed home countries.
- ♦ The commitment of human capital knowledge from highly educated individuals to return.

Setiawan et al. (2016) emphasized the need to combine and adapt brain gain definition to comprise internal migrations within boundaries of one country, rather than only between countries. Furthermore, internal migration direction is noteworthy in a large territorial country (Amrin et al. 2020). In addition, Indonesia is unique with over 17,500 islands and high economic growth, however inter-island education gap led to the development of brain gain definition into internal migrations. Moreover, this definition refers to the alteration of educated and skilled personnel from the dominant growth island (Java island) to the lesser (Sumatera, Kalimantan, Sulawesi, Nusa Tenggara, Maluku, Papua and others); and from the urban (metropolitan) with high educational access to less in the rural area.

The concept of brain gain is indeed relatively new, with little focus on regeneration of rural agricultural actors. Furthermore, brain gain has three

definitions in the agricultural sector, including first, educated, innovative, creative, and skilled qualified young workers returning home from overseas (international brain gain). Second, mobilization to rural or hometowns from urban areas (internal brain gain) to create, work, and do business in the fields (on-farm, off-farm, up-stream, down-streams, and supporting system). The last definition is in relation to physical and virtual mobilization (Faiz 2007; Kupets 2012; Setiawan et al. 2015; Bahadur and Dhimal 2017).

Brain gain overcomes tangible and intangible resource problems as a strategy to develop human resources, where the latter facilitates increased foreign language skills, business, innovation and creativity (Muthuuri and Kihara 2014). This leads to reduced migration rates and unveiled opportunities for agricultural entrepreneurship. Also, incentives are provided in the form of taxes and an increase in investment. In addition, two ways have been used to attract educated and skilled workers, comprising innovation, resulting in increased individual skills between formal and informal qualifications, as well as public policy schemes related to science and technological access (Goschin and Roman 2012; Heitor et al. 2014; Boncea 2015).

METHODOLOGY

Mixed methods research is used to analyze the potential brain gain actors as an alternative for agricultural sector regeneration in Central and West Java, Indonesia, and primary and secondary data is employed. Furthermore, snow ball sampling technique was used to retrieve the primary data, and obtained samples were by scrolling from brain gain respondents. The initial identification began by interview of brain gain actors who were experts in various agricultural activity resources, especially horticultural commodities attractive to millennials.

The data were collected using open and closed ended questions, while the next respondents were obtained by a network of direct or indirect relationship. In addition, a total of 30 persons were extensively interviewed to determine the factors affecting brain gain actors and stakeholders in relation to policies. Literature review was conducted by comparing and combining the various research articles discoveries on brain gain

potential as the agricultural regeneration innovation and achieving sustainability via extension development. The secondary data was derived from relevant agencies, and the analysis as well as description matched the study objectives. Furthermore, the affecting factors and stakeholders mapping were evaluated through linear regression and interest-influence matrix.

RESULTS AND DISCUSSION

The Potential Brain Gain Actors in the Agricultural Sector

The phenomenon of brain gain practically occurred in Indonesia for many years, although no formal regeneration policy has been instituted (Setiawan et al. 2016). In addition, the number of young farmers aged below 45 years has declined to about 3.4 percent over five-year period from 2013-2018, despite the overall increase by 5.6 percent. Conversely, there is a marked increase in the young generations' interest, thus the potential for regeneration is elevated. This prompts the need to construct a strategy for brain gain actors to work in the agricultural sector, after completing education, which serves as an approach towards technical innovation, and further strengthens social and economic development. These findings conform with Zhou and Luo's study (2018) where educational inputs, especially at higher level reportedly improve the quality and capital of human resources, subsequently contributing to innovative development.

The high interest is shown in the Indonesian higher education statistical data of 2018. This is evidenced by the proportion of lecturers or academics, as professor in agricultural field (16.79 %), ranked after Sciences. In addition, the total number of students increased by 64.16 percent between 2010 and 2018. The data obtained from Agricultural Development Polytechnic, as an educational institution under the Ministry of Agriculture, showed 13.38 times a increase in student interest, over 2013-2018. However, the dominant education level in this sector is low, thus indicating the potential for fresh graduates of these institutions to serve as brain gain actors. Setiawan et al. (2016) identified some youths in this category, alongside retired educated and skilled el-

ders currently in the villages of West Java. Furthermore, educated actors are qualified based on high formal education achievement, and non-formal learning, through training and internships.

The Indonesian government has conducted various regenerative approaches, including young entrepreneur development program, extension optimization to encourage youth farmers, training, as well as internship for youth farmer group and millennial students. These brain gain opportunities are possibly derived from Islamic boarding schools, and farming aspects are included in the learning curriculum. However, the temporary nature of these unsustainable mobilization efforts have been implicated in unsuccessful regeneration programs.

Brain Gain as Regeneration Innovation towards Advanced Agriculture

The role of extension in Indonesia is very dominant, especially to improve the farmers' productivity and income. This plays a huge role in bridging the communication gap between government and beneficiaries. However, challenges have been observed in the aspect of funding, administration, educational institution separation, research and extension service, and also because of limited connections to the mass, electronic, and internet media. These extension programs are performed through face-to-face systems, characterized by geographical dispersion to communities, and is known to increase cost (Maiangwa et al. 2010; Zulfiningrum et al. 2019). In addition, it is also important to focus on institutional structure diversity, because the aspect of decentralization, financial viability, agricultural innovation technology 4.0, communication, participation, and local wisdom development towards modernization minimizes negative impacts and ensures adaptation to climate change (Luu and Nguyen 2017).

The public agricultural extension in Indonesia currently comprises 28,102 people and 17,011 assistance workers. Furthermore, there were a total of 75,436 rural villages, and 8,444 downtowns, where the service is expected to achieve the ideal conditions of each. Moreover, the absence of quantitative and qualitative programs has led to low performance, and poor support for extension transformation. Therefore, it is recommended to integrate a continuous extension model with pri-

vate, and related parties, including farmer groups, associations, and non-governmental organizations, where the government impacts in terms of strategy development. This approach is required to ensure the evolution of agricultural extension systems, characterized by subsidized and supplemented characteristic (Hoffman et al. 2000; Atish and Chand 2019). The 27,449 potential farmers and extension workers need better support and involvement in sustainability development. This is to ensure participation, as living amongst farmers creates a direct relationship, and elevates the spirit of one another (Syahyuti 2014).

There is a significant increase in activities relating to the agricultural education with potentials to solve regeneration problems. This is achieved through the involvement of brain gain actors in the form of progressive farmers, private extension agents or public agricultural extension workers. The capacity gap suffered under this circumstance is due to the lack of support from educational institution, temporary training, and extension, depending on the available grants or programs. Therefore, absolute reliance on governmental policies is minimized as a result of competent personnel (Haryanto et al. 2018). The concept of regeneration to ascertain the position of education and skill as an agropreneur based on certain driving factors. Progressive farmers and extension workers act as role models, trainers, business case studies, companion and motivation for achieving accelerated improvement.

Obstacles and Challenges

The network readiness index showed Indonesia's willingness for digital revolution ranked 73th from a collection of 139 countries, while the number of farmers using the internet increased to 13.45 percent. Subsequent management challenges of the extension system from industrial revolution 4.0 perceived the introduction of big data as a solution in the new society 5.0. In addition, the vision of establishing Indonesia as the world food storage in 2045 is assumed to be driven by information technology, which includes the use of optimized cyber extension to solve agricultural beneficiary gaps through varied affordable access.

The event of brain drain leads to resource scarcity in the form of intellectual skills, ineffective communication, and also slows technologi-

cal innovation adoption, resulting to vulnerabilities in achieving food sovereignty. However, the outcome appeared not to have improved due to the negative mental perception about the country. The government actions often tend to easily favor financial interventions, including subsidies (Omotayo and Zikhali 2019), expected to encourage small-holder farmers, and depend heavily on public programs. Therefore, it is important to reform the extension policy for effective rebranding through the fundamentals of philosophy, sociology, and psychology. Furthermore, stakeholders in rural developmental interventions are expected to consider the expertise of social actors (Jerome et al. 2019).

Factors Affecting the Decision of Brain Gain Actors

The performance of agricultural business in rural communities is driven by several factors, including the decisions and actions of brain gain players, in addition to government innovation policies (Hall 2005), and influences due to educational aspirations (Böhme 2015). The characteristics of brain gain from 30 respondents who returned to the rural area and conducted agricultural business based on the snow ball sampling technique is presented in Table 1.

Table 1: Descriptive characteristics of brain gain actors

<i>Characteristics</i>	<i>Dominant category</i>	<i>Total (Percent)</i>
Age	25 – 45 years old	53.3
The latest educational level	Bachelor	40
Study program achieved	Agriculture in widely definition	50
The latest job taken	Student (Fresh graduate)	13.3

The results showed most actors are educated youth with basic knowledge in agriculture, according to existing business type. Meanwhile, this training easily adopts technological innovation related to horticultural commodities, which attract the interest of young generation in areas of hydroponic cultivation, verticulture, and green house culture.

Systematic review showed the driving and pulling factors were evident in influencing brain gain actors for short and long term, respectively. In addition, this behavior is categorized into primary and secondary brain gains which were not captured on previous studies (Faiz 2007; Fan and Yakita 2011). The results of regression analysis show that the pull factors had significant effect compared to the driving factors presented in Table 2.

Table 2: Regression analysis result on the factors affecting brain gain actors

Description	Value	t	Sig.
R Square	0.380		
Pulling factors (X_1)		4.016	0.000*
Driving factors (X_2)		0.220	0.827
(Constant)		0.338	0.738

Predictors: (constant) pulling factors, driving factors
Dependent variable: The decision to do brain gain

The sig* value showed the influence of pull factors on the decision to do brain gain, while the driving factors observed no effect, although the determination coefficient (R square) contributed 38 percent. However, the statistical model between a dependent and independent variable (in this case only the pull factors) is:

$$Y = 4.016X_1 + \epsilon_1, R^2 = 0.380$$

The results showed the brain gain factors influencing rural area as marked by the non-governmental act, were attributed to individual and family support without extension, education, or training. This potential is assumed to be legalized by facilitating related agencies as the agricultural regeneration actors runs slowly. This condition was in line with Saefulloh (2012) who recommended the phenomenon of brain drain on human resources Indonesia can be changed into brain gain with the national innovation system of scientist involvement or the application of policies such as Portuguese related commitment to science that demonstrates a significant improvement of the scientific community (Hasanefendic 2017).

Pull factors are generally categorized into five, termed income, better employment environment, guaranteed future, individual freedom and political stability (Kattel and Sapkota 2018). The results showed most brain gain actors returned to their villages to carry out commercial farming activities using environmentally friendly technology

in family allocated lands. Furthermore, horticultural commodities tend to be highly cultivated crops due to open business opportunities, and easier access to modern markets. This supports the notion report by Setiawan et al. (2016), where primary brain gain actors were estimated to have greater interests in structural factors, including commodity price and market development. Meanwhile, the secondary players are predominantly attracted by socio-cultural and natural factors.

Several stakeholders were initially identified through an in-depth interview to investigate the actors contributing to brain gain innovations (Table 3). This study classified stakeholders in an interest-influence matrix (Reed et al. 2009), which displayed their attributes and inter-relationships (Fig.1). In addition, the research defined stakeholders as individuals or groups with common interest, rights, and contribution to either the work or the outcome of the project (Walker et al. 2007).

Table 3: Stakeholders related to brain gain policies

Key stakeholders	Supporting stakeholders
Regional leaders–Regent	
Ministry of Agriculture	Regional revenue agency
University	Agricultural service area
Farmers	Agricultural businessman
Agricultural extension workers	Financial institutions
Training institute	Non-government organizations
College student	
University graduate association/diaspora	

The ranking result showed the regional leaders, Ministry of Agriculture and agricultural businessman as key players to the success of the program through the brain gain policy, therefore respective roles are optimized to attract youth participation.

CONCLUSION

The brain gain prospects in Indonesia has resulted in significant internal migration. This is characterized by the return of educated and skilled personnel, including young and old people to conduct agricultural business in rural communities. These innovative actors provide viable solutions to the challenges of technology 4.0. There-

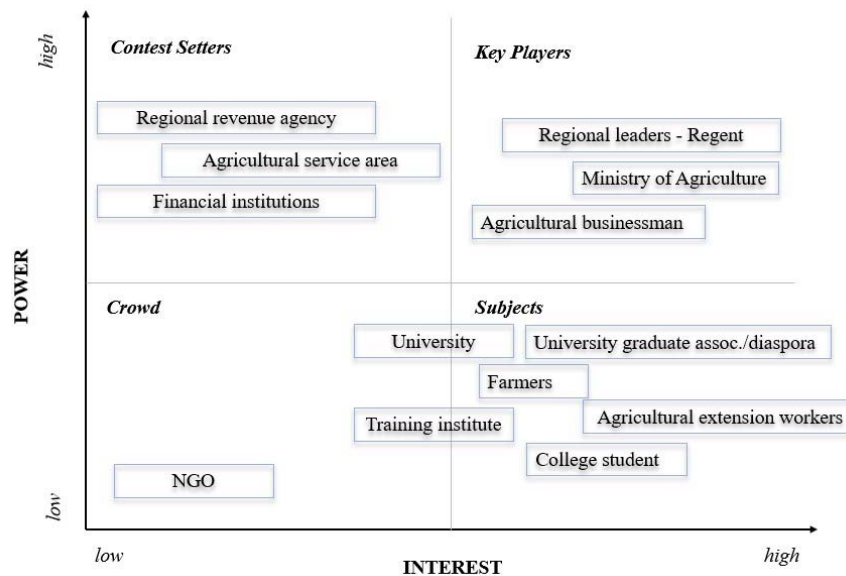


Fig. 1. Interest-influence matrix of brain gain in agricultural sector

Source: Research data results

fore, it is important to study brain gain potentials on a yearly basis in order to overcome related regeneration problems.

The regression analysis results showed a significant effect of the pull factors, including higher income, better employment environment, guaranteed future, individual freedom and political stability. However, the dominant driving factors comprise availability of family land, community empowerment, and implementation of environmentally friendly technology. The government, as a key player, is expected to develop a sound strategy applicable to extension services, including from farmers to farmers, by introducing potential brain gain influences, in the form of policies, institution encouragement, facilities improvement, and open access programs. These provisions further ensure support, with readiness to ensure sustainable agricultural development.

RECOMMENDATIONS

This study recommends the inclusion of a legal framework by relevant government agencies, to address key issues influencing brain gain in the agricultural sector, both domestic and international. Also, there is need for further collabora-

tion between authorities to develop a mechanism, required to prevent urbanization growth. Furthermore, there is also an obligation to introduce agric-business innovation, particularly the technologically driven forms, to further appeal to youth considering rural migration. Subsequently, provisions on agricultural and entrepreneurship training are to be included at various academic levels as a form of motivation, and access to credit facilities with financial limitations and market opportunities are also advised. The role of stakeholders is important in promoting the youth regeneration farmers in Indonesia, thus the need for a conducive environment to ensure improved skills. This also includes essential services, comprising agricultural training and extension services, characterized by extensive collaboration efforts with tertiary institutions to achieve sustainability.

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