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Mapping and Categorizing Self-Help Agricultural Training Centers (SARTC) in South Sulawesi, Indonesia

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ABSTRACT

Self-Help Agricultural Training Centers (SARTC) is an institution established by advanced farmers with a willingness to share their successful farming experiences and create a learning community with peers. Mapping and classifying SARTC informs farming excellence and training service capability standards so that governments, communities, and farmers can obtain technologies that are more appropriate to the region's conditions. Therefore, this study aims to map and categorize SARTC in South Sulawesi, Indonesia. Data collection was conducted through interviews and observations by combining spatial analysis, interview results, and secondary data. The results showed that SARTC are spread across each geographical zone and classified based on their ability to provide training services independently. Based on this finding, SARTC have functioned as farmer-to-farmer extension institutions that are specifically organized and not individualized. The capability class of SARTC was found to be more dominant in the intermediate and primary classes. Therefore, the policy to be pursued is to upgrade the SARTC capability class to the primary class to make participatory extension more effective.

1. INTRODUCTION

Farmer institutions are known to play a strategic role in fostering agribusiness systems in rural areas [1, 2]. The activities of these institutions are focused on addressing the basic resources needed by farmers [3] in various contexts of vulnerability [4, 5]. Furthermore, institutionalism is a comprehensive concept associated with structure, comprising patterns of activity stemming from norms to meet human needs [6] and organizational patterns required for their execution [7, 8]. The Self-Help Agricultural Training Centers (SARTC) is an institution established, owned, and managed by farmers independently, either individually or in groups. This organization plays an active role in agricultural development by enhancing resources through farmer-to-farmer training and engagement with rural communities [9, 10].

The concept has a significant impact on knowledge, including analytical skills, critical thinking, locality interaction, and the ability to make informed decisions within the agricultural ecosystem [11, 12]. This approach can be described as a concerted effort to facilitate knowledge exchange among individuals on agricultural cultivation, technology, the environment, and various social issues. SARTC was initiated by advanced farmers who intended to share their successful farming experiences to form a learning community [13]. This is achieved through learning-by-doing or apprenticeship methods based on factual conditions in the field [14].

SARTC is often distinguished by its unique superior commodity, thereby becoming a special characteristic in providing services. Meanwhile, government extension services are limited by various factors, including the availability of extension workers and the lack of resources in managing the organization [8, 15]. The gap between government extension services and the strategic potential of SARTC must be explored further to realize cooperation in an adaptive and sustainable system. The number of SARTC in South Sulawesi is 41 institutions. The presence of SARTC impacts alternative training places for farmers and rural residents outside of training places owned by the government and private institutions.

Farmers assuming the role of extension workers for their peers is an ultimate form of participation in agricultural development [16]. This approach, with or without external support is commonly referred to as farmer-to-farmer extension (FFE) [17, 18], which indirectly empowers individuals to be the pioneers of changes in mindset and behavior patterns towards more advanced conditions [19].

There are limited reports on SARTC, including the technical aspects [20], the influence of capacity building [21], interaction and communication [10, 22], economic and institutional performance [13], and motivation of self-help extension workers [23] in playing their role as trainers. Among

these studies, none has focused on mapping the location distribution and status classification of the institutions. Knowledge of this can project a learning capacity driven from farmer-to-farmer extension. The research will also contribute to the literature on participatory training with a focus on the skill classes of the training institutions based on the spread of their locations. In this study, what is meant by the spread of SARTC is the existence of the SARTC agency presented on the map of South Sulawesi. Participatory training is a training service based on business excellence and product ownership. Therefore, this study aimed to analyze the location distribution of SARTC institutions at the provincial level and to classify SARTC based on the capability criteria. The ability of these organizations to function in extension services, technology applications, and learning platforms for farmers and rural communities was assessed. After this introductory section, the method was described, followed by the results and discussion, which were closed with a conclusion.

2. METHODS

This study was conducted at SARTC in South Sulawesi Province, consisting of five zones based on the determination by the Communication Forum, which divides the territories according to the proximity of the geographical area. These zones included: (1) South Zone comprising Gowa, Takalar, Jeneponto, Bantaeng, Bulukumba, Selayar; (2) North Zone consisting of Maros, Pangkep, Barru, Pare-pare, Pinrang, Sidrap, and Makassar City; (3) Bosowa Zone comprising Bone, Soppeng, Wajo, Sinjai Regency; (4) Massenrempulu Zone composed of Enrekang, Tana Toraja, and North Toraja Regency; and (5) Greater Luwu Zone consisting of Luwu, North Luwu, East Luwu, and Palopo City. The study location is presented in Figure 1.

Data were collected from each zone, including the coordinates of the SARTC location, facilities/infrastructure, activities run, human resources, and farms managed, as well as the number of villages, extension workers, and farmers. These data were collected through interviews and observations at each SARTC, as well as from the Agricultural Extension Information System (AEIS) and the SARTC Communication Forum.

Data processing was carried out through spatial and SARTC classification analyses. Spatial analysis was performed by overlaying several maps, producing a new map from the process [24]. The distribution of SARTC was mapped by identifying coordinate point data through the Global Positioning System (GPS) and checking directly on Google Earth coordinate points. We used the relevant Average Nearest Neighbor (ANN) technique was then used to determine the location distribution pattern of each SARTC based on the global information system (GIS) 10.3. This analysis provided a map of the location distribution based on each zone.

Classification analysis aimed to determine the capability class of SARTC based on certain criteria. These criteria were dependent on indicators from the Indonesia Ministry of Agriculture. The classification of SARTC based on their institutional capability class consisted of primary, intermediate, main, and advanced. The criteria for each capability class are shown in Table 1.

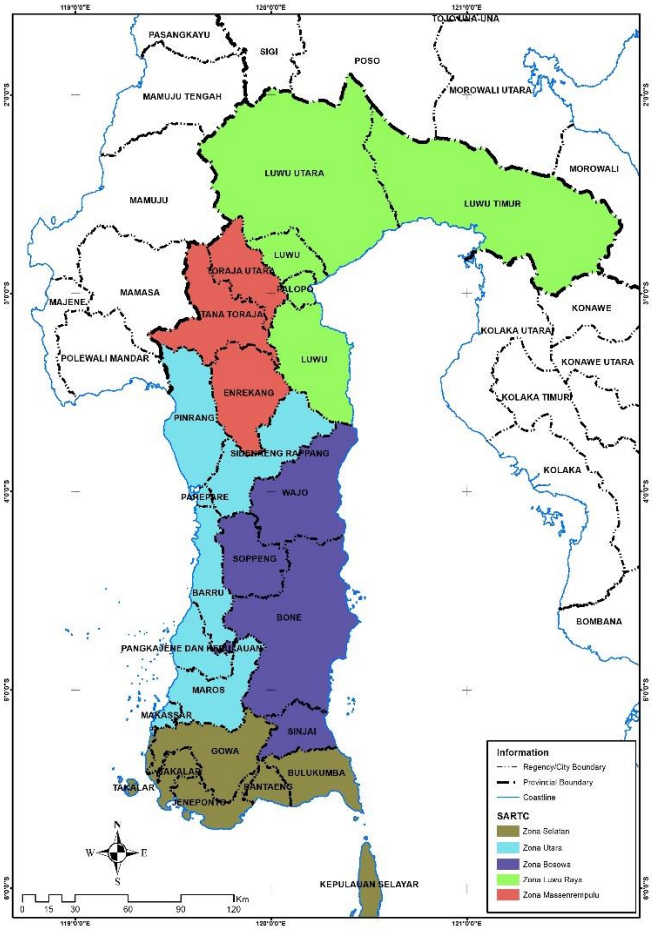

Figure 1. The locations of SARTC research in South Sulawesi Province

Table 1. Criteria for classification of SARTC institution capability classes

Classification of SARTC Institution Capability Class							
	Primary		**Intermediate**		**Main**		**Advanced**
			Meets Primary Criteria		**Meets Intermediate Criteria**		**Meets Main Criteria Meets Intermediate Criteria**
					Meets Primary Criteria		**Meets Primary Criteria**
1	Have the potential to organize training/apprenticeship in terms of available infrastructure and technology.	1	Have organized structured training (planning, preparing materials, conducting, evaluating training, and post-training follow-up guidance).	1	Have organized training/apprenticeship independently.	1	Realizing the implementation of training/apprenticeship and mentoring independently.

2	Have conducted self-help apprenticeship activities for farmers and agricultural business actors, school students, as well as university students.	2	Have carried out efforts to develop cadres of farmers in the surrounding area.	2	Have carried out self-help extension independently.	2	Realizing creation and innovation products.
3	The excellence of the developed farming business influences the development of the surrounding local economy.	3	Have attended the Agricultural Extension Methodology Training.	3	Have accessed technology and funding sources independently.	3	Realizing a network of cooperation in technology development.
4	Have a strong willingness to seek, discover, and engineer better ways of farming and transfer the technology developed.	4	Have attended the Apprenticeship Management Training for Self-Help Agricultural Training Institutions.			4	Creating a market.
5	Known by the surrounding community and registered by the institution that handles extension services.	5	Have participated in Instructor Training for Self-Help Agricultural Training Institutions.				
6	Human resource managers have attended training or are competent to manage independent Agricultural Training Institutions (related to administration, organization, and management).						

3. RESULTS

3.1 Distribution of SARTC in South Sulawesi Province

The results regarding the number of SARTC in each zone, as well as extension workers, districts, villages, and farmers in the regencies/cities, are presented in Table 2. The distribution of each SARTC in South Sulawesi Province is illustrated in Figure 2.

The results showed that there were 41 active SARTC in South Sulawesi Province, and among the 24 regencies, 17 (70.83%) have SARTC. Based on the regional zoning established by the SARTC Communication Forum of South Sulawesi Province, 14 (34.1%), 12(29.26%), 6 (14.63%), 6 (14.63%), and 3 (7.31%) were active in the South, North, Bosowa, Luwu Raya, and the Massenrengpulu Zone respectively. Regency without SARTC included Selayar Islands and Makassar City (South Zone), Barru and Pare-pare City (North Zone), Sinjai (Bosowa Zone), as well as Tana Toraja and North Toraja (Massenrengpulu Zone).

SARTC constitutes part of the learning process for farmers and rural communities. The number of farmers in the province in 2022 was estimated at 1,482,682 people, with 3,048 villages. Moreover, there were 2,852 agricultural extension workers widespread across the District Agricultural Extension Center, Regency Agriculture Office, Provincial Agriculture Office, and National Agricultural Technology Application Center. SARTC is a self-help learning institution for farmers and rural communities, while agricultural extension workers are facilitators of learning. Both work together to promote farmer and rural community learning

The large number of farmers in South Sulawesi requires a more adequate outreach learning system. This outreach relies not only on government extension workers but also on the participation of farming communities. SARTC was initiated by advanced farmers on a self-supporting basis, and it complemented the role of farmer groups rather than acting independently. However, Table 2 shows that seven regencies did not have a SARTC by 2022, indicating the initiative of advanced farmers for FFE remained weak.

Agricultural extension workers have been using farmer groups as a platform for learning, a vehicle for cooperation, and a production unit. However, several problems were faced in relation to their position as distributors of government assistance in the form of production inputs. These problems include free riders, blurred common goals, lack of communication, low access to markets and financial institutions, as well as low organizational management capacity [25-27].

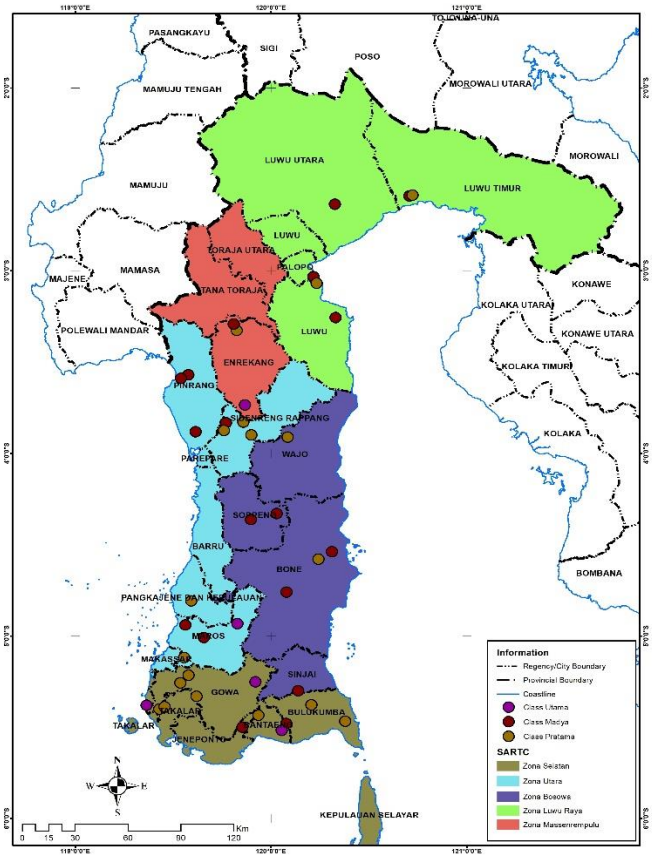

Figure 2. Zoning map of SARTC distribution in South Sulawesi

Table 2. Number of SARTC, extension workers, districts, villages, and farmers in each district/city by zone in South Sulawesi

Regency/City	Zone	Total				
		SARTC	Extension Worker	District	Village	Farmer
Gowa	South Zone	4	114	18	167	94.955
Takalar	South Zone	3	91	10	100	53.204
Jeneponto	South Zone	1	186	11	113	91.534
Bantaeng	South Zone	3	73	8	67	45.203
Bulukumba	South Zone	3	160	10	136	72.565
Selayar Islands	South Zone		118	11	88	16.051
Makassar	North Zone		61	15	153	7.006
Maros	North Zone	4	115	14	103	49.627
Pangkep	North Zone	1	57	13	103	29.868
Barru	North Zone		62	7	55	31.648
Parepare City	North Zone		27	4	22	3.248
Sidrap	North Zone	4	150	11	106	80.104
Pinrang	North Zone	3	109	12	109	85.634
Bone	Bosowa Zone	3	190	27	372	227.525
Soppeng	Bosowa Zone	2	127	8	70	66.239
Wajo	Bosowa Zone	1	148	14	190	78.496
Sinjai	Bosowa Zone		77	9	80	50.960
Palopo City	Luwu Raya Zone	1	60	9	48	11.884
Luwu	Luwu Raya Zone	2	210	22	227	89.924
Luwu Utara	Luwu Raya Zone	1	259	15	173	79.465
Luwu Timur	Luwu Raya Zone	2	141	11	127	62.726
Enrekang	Massenrempulu Zone	3	135	12	129	57.743
Tana Toraja	Massenrempulu Zone		75	19	159	48.662
North Toraja	Massenrempulu Zone		57	21	151	48.354
	Total	41	2.852	311	3.048	1,482.625

3.2 Classification of SARTC classes in South Sulawesi Province

The assessment results for the classification of SARTC based on zones, regency, and training services carried out are presented in Table 3 and Figure 3.

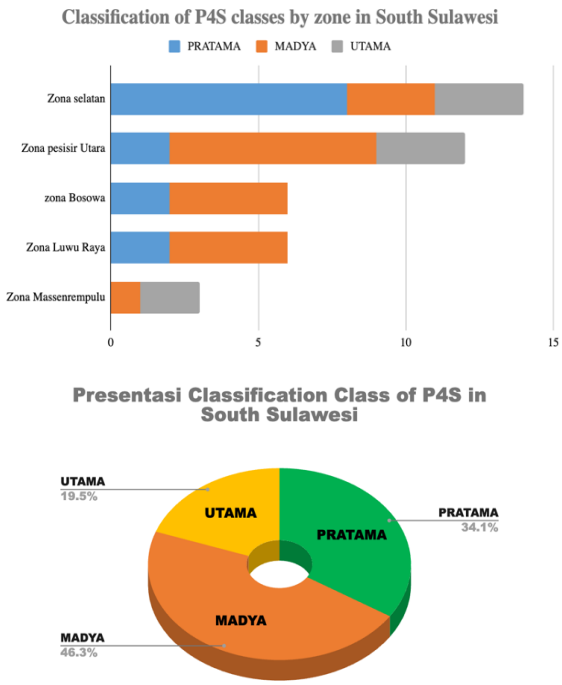

Figure 3. Class classification of SARTC institutions in South Sulawesi

The results showed that the classification of SARTC was more dominant in the Intermediate class, namely 19 (46.3%), followed by the Primary class of 14 (34.1%) and the Main class of eight SARTC (19.5%). The Intermediate class was more prevalent in the North Zone with seven SARTC (36.80%), while the Primary class was higher in the South Zone with eight (57.14%). Furthermore, the Main class was almost evenly distributed between zones, with three SARTC in the North, three in the South, and two in the Massenrengpulu Zone. In the Bosowa and Luwu Raya Zone, there were no SARTC in the Main class.

The criteria distinguishing the Main class from the Intermediate and Primary lies in the ability of SARTC to organize training/apprenticeships, conduct self-help extension, as well as access technology and funding sources independently. These capabilities are associated with the type of commodity cultivated so that it becomes a superior product of training services for strengthening the SARTC institutions. In the South and Massenrengpulu Zones, where the agroecology was highland, the commodities managed by Main-class SARTC included highland horticulture, corn, and chili. Meanwhile, in the North Zone, where the agroecology was rice and pasture, the commodities managed were farming systems, cattle, and rice. Training and internship services improved the knowledge, skills, attitudes, and experience of farmers as well as rural communities who learned about agroecological commodities advantageous to the specific location. The Main class SARTC, cannot be classified as an elite because it cannot yet independently mentor farmers and rural youth to realize creative and innovative products, establish technology development networks, and create markets.

The intermediate (46.30%) and primary (34.10%) SARTC represent potential strengths of self-help. In these two classes of SARTC, several advanced farmers have organized themselves to manage apprenticeships and develop cadres in the vicinity. Some of these advanced farmers have also received competency upgrades from the government regarding agricultural extension methods and apprenticeship management.

Table 3. Classification of SARTC classes by zone in South Sulawesi

Zone	Regency	SARTC Name	Classification	Main Commodities that are the Focus of Training Services
South Zone	Gowa	Sipakatau	Primary	Horticulture
		Buluballea	Main	Highland Horticulture
		Boritallasa'	Primary	Highland Horticulture
		Nurul Fajri Mulia	Primary	Corn
	Takalar	Terang-Terang	Intermediate	Integrated Farming System
		Julukanaya	Primary	Corn
		Alam Hijau Lestari	Primary	Corn
	Jeneponto	Merapi	Main	Highland Horticulture
	Bantaeng	Bunga Harapan	Main	Corn
		Insan Cemerlang	Intermediate	Cocoa
		Puncak Raya	Primary	Highland Horticulture
	Bulukumba	Citra Mandiri	Intermediate	Horticulture
		Salassae	Primary	Natural Agriculture
		Tamalanrea	Primary	Rice
North Zone	Maros	Asamayama	Main	Integrated Farming System
		Shafana Cakrawala	Main	Cattle Farming
		Nijalling Alam Makmur	Main	Rice
		Marannu	Primary	Food Processing
	Pangkep	Mappideceng	Intermediate	Rice
	Sidrap	Semangat Milenial	Primary	Plantation Crops
		Barantas	Intermediate	Rice
		Bukit Melintang	Intermediate	Organic Rice
		Pemuda Batue Raya	Intermediate	Rice
	Pinrang	Alam Indah	Intermediate	Integrated Farming System
		Nurul Imam Bungi	Intermediate	Rice
		Pammase Dewata	Intermediate	Organic Fertilizer
Bosowa Zone	Bone	KWT An-Nisa Ghony	Intermediate	Food Processing
		Agro Satwa Lampoko	Primary	Rice
		Wanua Lampoko	Primary	Integrated Farming System
	Soppeng	Sejahtera	Intermediate	Organic Fertilizer
		Syukur	Intermediate	Integrated Farming System
	Wajo	Siperennue	Intermediate	Cocoa
Luwu Raya Zone	Palopo	Temangngingi	Intermediate	Organic Fertilizer
	Luwu	Tunas Harapan	Primary	Cocoa
		Buah Harapan	Intermediate	Cocoa
	Luwu Utara	Buana Reso	Intermediate	Cocoa
	Luwu Timur	Sinar Bosso Batu	Intermediate	Cocoa
		Benteng Kakao	Primary	Cocoa
Massenrempulu Zone	Enrekang	Massenrempulu	Main	Highland Horticulture
		Laskar Pelangi	Main	Chili
		Bunga Duri	Intermediate	Coffee

Source: Data analysis 2022

4. DISCUSSION

This study found that several advanced farmers independently conduct training for communities in SARTC at various skill levels and across different zones. Within these SARTC, numerous aspects such as leadership, organizational management, institutional innovation, and learning through training were developed. This was in line with previous studies [28, 29] stating that independent farmer organizations produced leaders who effectively mastered institutional innovations in rural resource management through the development of effective training rules and procedures, as well as the use of new technologies. However, several factors need to be considered for the sustainability of SARTC operations.

As stated, the role transition factor is decisive in farmers transitioning into a trainer for their peers [30]. In SARTC, advanced farmers experience a role transition from farm manager to apprentice trainer or facilitator. This transition comprises various complex aspects, including changes in the social structure which impact the new role. Therefore, agricultural extension workers who directly engage in coaching SARTC need to facilitate the acceleration of the role transition. Several factors [31] need to be considered including the 'desire to adjust', 'open-mindedness', 'self-confidence', the fulfillment of expectations, knowledge about the new role, coping with the family, and interactions with the wider social environment. These factors need to be addressed to enable upscaling from SARTC Primary to the Advanced class.

Another aspect is the effectiveness of SARTC training on technology adoption and its subsequent impact on increased agricultural production. In Tanzania, a previous study found that trainee farmers who adopted new technologies experienced higher production than those who did not receive training [32]. However, over time, the technology was also adopted by non-trained farmers. The bonding factor between trainee and non-trainee farmers served as a channel for

technology transfer. A previous study in Malawi found that farmer-to-farmer training was positively associated with the adoption of sustainable land management [12], observable two years after the FFE intervention. In the case of SARTC in South Sulawesi, technology adoption and technology transfer were achieved within one or two years after the training. This indicated that there was a time lag in the adoption of new technologies. During this time lag, the role of farmer groups and social interaction between trainees and ordinary farmers is very important.

The willingness to pay for the technology offered was also identified as a factor for the continuity of SARTC in South Sulawesi. Farmers who participated in training incurred costs for apprenticeship or following a particular package. The financial sustainability of the SARTC and its efforts to upgrade from primary to advanced class was determined by the willingness of farmers, village youth, or students to pay for the training. According to a study on lead farmer extension in Tanzania [33], it is important to consider the willingness of smallholders to pay when adopting new agricultural technologies. There is also a need to determine whether the training at SARTC has helped farmers identify the right technology upgrades for their farms and accurately calculate the value derived from those upgrades. The existence of SATRC in South Sulawesi has made a real contribution as a learning tool to support farmers and help government farmers in the application of science, skills, and technology. In addition, the SATRC institution has cultivated and developed farmers' development, built partnerships with entrepreneurs, and access capital, agricultural facilities, and market access opportunities.

5. CONCLUSIONS

In conclusion, advanced farmers were found to play a training role through an institution called SARTC. This is a variant of FFE, farmer-led extension, or participatory extension with the specificity of functioning as an institution, not individually. This study found that SARTC in South Sulawesi, institutions were classified based on their capability to deliver agricultural knowledge and technology independently. Each SARTC was spread across different zones in the region, with training service capabilities based on specific commodities in agroecology. Three factors must be considered in the SARTC development policy, including the transition of advanced farmers into trainers, the effectiveness of new technologies in increasing agricultural production, as well as the willingness of farmers and rural youth to pay for the training packages. The limitation of this study was the lack of in-depth analysis at the SARTC unit level. Therefore, further analysis is recommended to explore SARTC cases that are unique in terms of activities carried out and performance achieved.

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