Technical Empowerment of Agricultural Cooperatives in Malaysia

Ahmad Safuan Bujang
Promotion and Business Development Center, MARDI
Persiaran MARDI-UPM, 43400 SERDANG, MALAYSIA
Email: asafuan@mardi.gov.my

ABSTRACT

A delicate balance must be achieved between socio-economic development and protection of the environment. Under the SDG, a set of 17 goals were introduced to achieve this triple bottom line of economic, social and environmental objectives. Food production cannot continue in its "business as usual" setting and requires intervention in the form of technological advancements in agriculture to spur a second green revolution towards creating a sustainable and nutrition-centric value chain. Within this framework, lies the importance of molding agricultural cooperatives to adhere to these needs as well as taking advantage of changing trends in food consumption. With its role as the third engine of growth, cooperatives or agricultural cooperative in particular, is strategically poised to aid initiatives and efforts in modernizing the Agrofood sector. PPK Kuala Langat serves as an interesting example of a dynamic and efficient cooperative model that bridges the gap of low skill and knowledge among smallholder members, with necessary technological empowerment. This is done through a collective mechanism that allows effective dissemination of knowledge and information, marketing and networking to ensure inclusivity of all member is assured.

INTRODUCTION

Food, socio-economic development and its interlinked relationship with the environment

"Irreversible", "unequivocal" and "Anthropocene" are terms often used as grim reminders for progress made in the name of development. The guise of development has always shadowed the uneasy truth that although the ceiling of progress is limitless, resources it requires are finite and the sphere it influences is fragile. The latest IPCC report (IPCC 2014) spells out the irreversible and unequivocal human influence on global climate, marking a clear geological epoch or Anthropocene, that requires immediate implementation of adaptation and mitigation strategies to reduce and manage risks of climate change. As we endeavor to address challenges of food security, its necessities and its changing trends, a delicate balance must be achieved for socio-economic development to end poverty and concurrently protecting the planet and ensuring prosperity to all.

This challenge is further exacerbated by climate change induced impacts to our physical, biological, and human and managed systems (Figure 1), necessitating a global effort to adapt and mitigate. Across the world, indirect pressures on food productions such as impacts on terrestrial and marine ecosystems, as well as uncertainties related to water supply from droughts or adverse impact of floods. It is obvious that current practices or policies governing it cannot proceed in its business-as-usual course. Through a multi-country effort, a set of 17 Sustainable Development Goals (SDG) were specified under the 2030 Agenda for Sustainable Development Plan (United Nations General Assembly 2015), that specifies a

synergistic and collaborative partnership between all countries and stakeholders towards shifting the world on to a sustainable and resilient path.

All 17 SDGs are cross-linked and heavily intertwined. Sustainable food and agriculture is the fundamental nexus between people and the planet. Achieving SDG#2 or to "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" will play an integral part in achieving other SDGs as well. Agriculture and food yields are already affected by climate change, thus placing communities especially in developing countries at risk of food shortage and hunger. Here, changes in dietary and food consumption habits further poses adds to the complexities of any mitigating and adaptation efforts. Studies have shown negative effects on agricultural production due to decreased production and disappearance of animal species. Thus, as shown in Figure 2, food security is affected across four dimensions: access, availability, utilization and stability (FAO 2016).

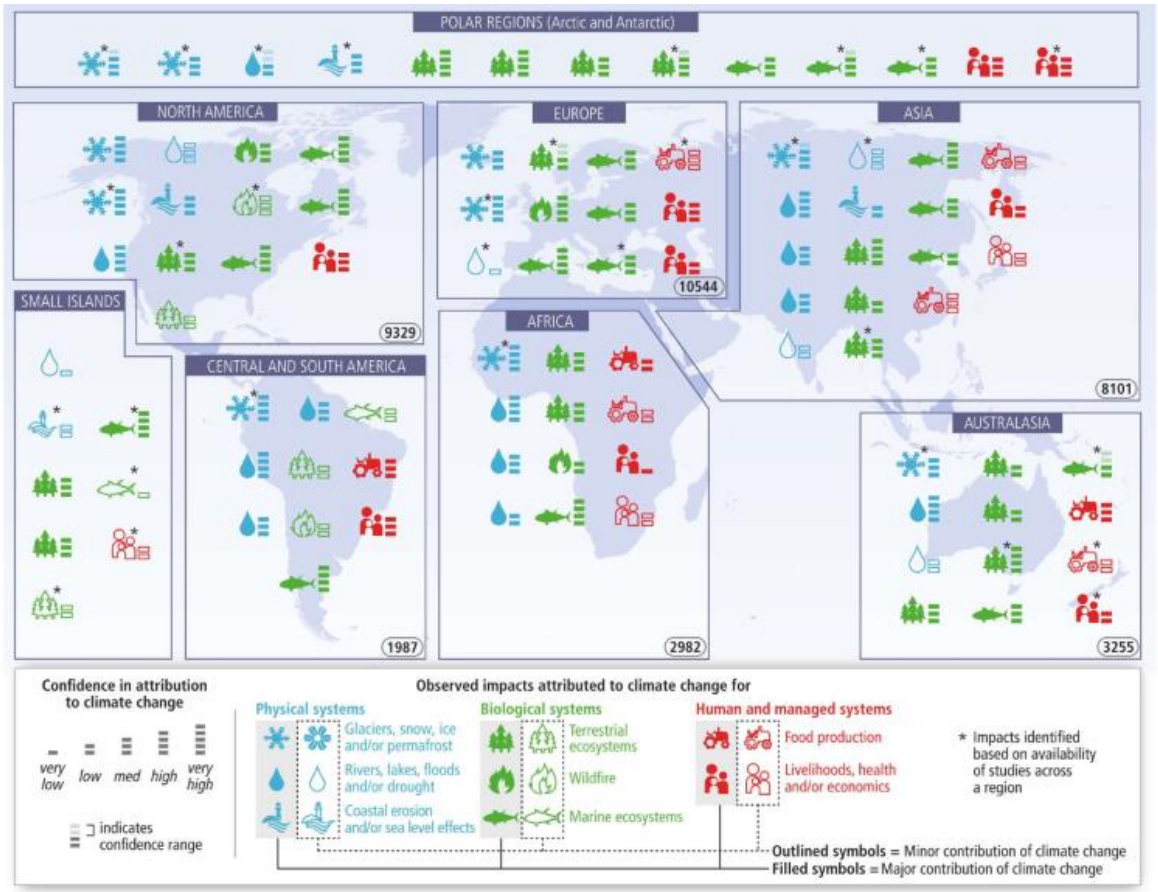

Fig. 1. Widespread impacts attributed to climate change based on available scientific literature since the Fourth Assessment Report (AR4) (IPCC 2014)

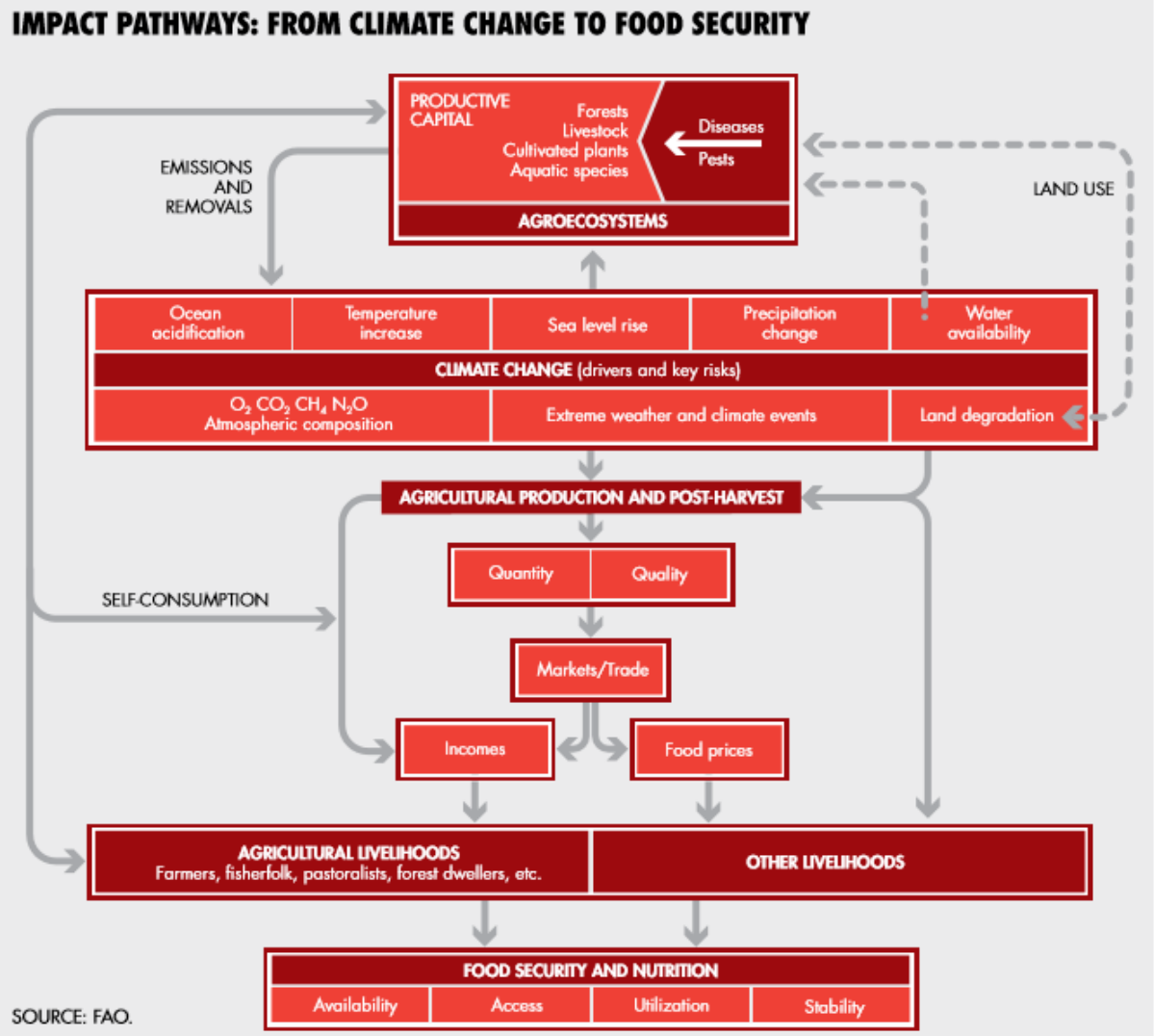

Fig. 2. Impact Pathways – From climate change to food security

On the flipside, this cause-and-effect loop highlights the risks to low income and high agriculture dependent communities. Agriculture and food sector at large contribute one-fifth of greenhouse emissions from losses of above and below ground organic matter, deforestation, enteric fermentation in livestock, fertilizer application, as well as fossil fuel use across the value chain. All these point towards the necessity of a second Green Revolution. This entails creating an agricultural sector that is able to sustainably provide abundant and healthy food, while requiring less resources, reducing encroachment on natural ecosystems and conservative utilization of ecosystem services and biodiversity (FAO 2016). As certain food crops face production plateaus, agricultural innovation in the form of new cultivation technologies, high-tech digital planting aids and botanical genomic manipulation will bring increased precision, efficiency and yield. Although technology will act as a springboard to this second green revolution, its role alone in food security policies will not be sufficient to overcome interdependencies of all five interlinked transformation drivers, where diet and food demand change is one of the five (Reardon and Timmer 2014).

Food security and changing trends

Ensuring food security for a growing population that is targeted to reach 8.5 billion by 2030 (United Nations General Assembly 2015) will involve providing stakeholders far greater access to technologies, markets, information and credit for investment to adjust their production systems and practices. This will allow them to adapt and mitigate the effects of climate change, while at the same time maintaining current food production capacities. Here, a broad-based transformation of food and agriculture systems will also promote an increase in agricultural production, improving global supply chain, increased access to nutritious food, as well as reducing post-harvest or food losses and wastes.

As seen in Figure 3, an increase in consumption of food types other than cereals, roots and pulses is seen across time, and is projected to rise further. Coupled with increasing calorific demand as well, diversification of food types will add additional strain to existing supply chain. In Asia, this change has been attributed to income increase, lifestyle changes through urbanization and changes in consumer attitudes and behavior (Pingali and Rosegrant 1995; Kearney 2010). Besides focusing on a sustainable supply chain to safeguard national food security, an emphasis in improvement of nutrition and health should also be given consideration. Future food policies must adhere to the need for a system that provides a sustainable and diversified supply of staples and macronutrient-rich foods, at the same time resisting excessive consumption energy-dense, nutrient-poor foods (Kearney 2010).

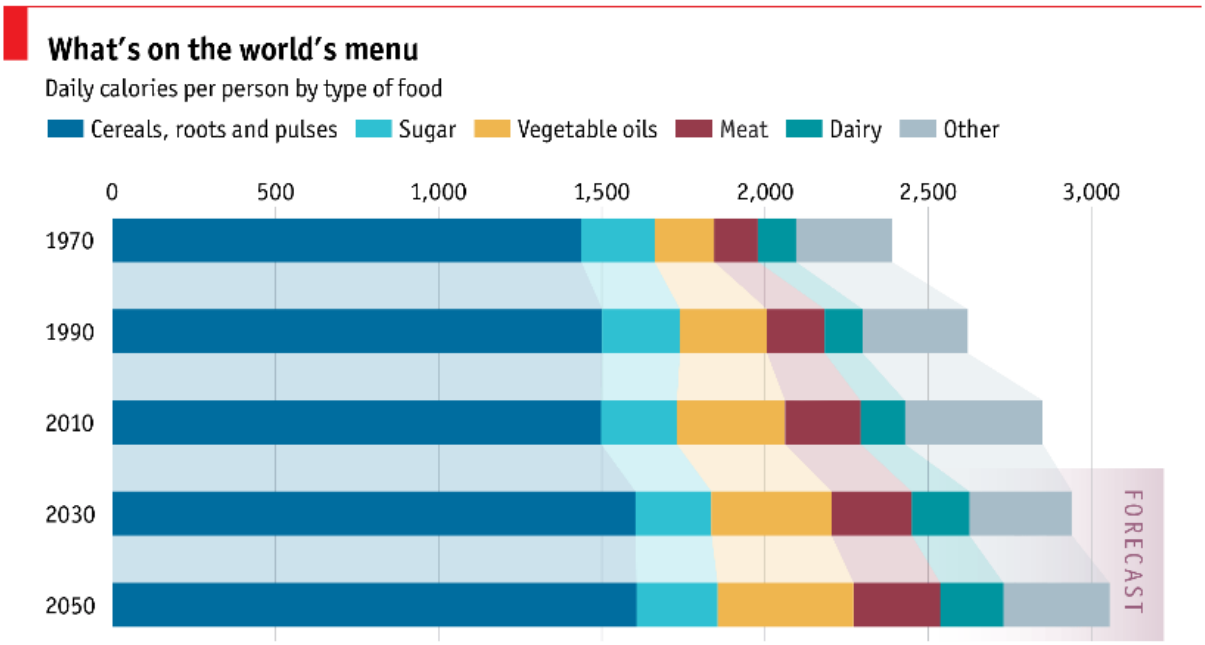

Fig. 3. Breakdown and projection of worldwide consumption based on type of food

Source: FAO

Within Malaysia, addressing issues of sustainability, food security and food consumption trend change must be viewed through several state policies. In-line with achieving goals tabulated under the latest SDG, Malaysia's aspiration to attain high-income country status comes concurrently with efforts in striving for greater inclusiveness among its inhabitants (EPU 2015b). Within this comprehensive plan to achieve inclusiveness and ensure sustainable socio-economic development, empowerment and transformation of the Agrofood

sector is paramount. This sector contributes to about 38.8% of total national GDP in 2015 and is projected to have a growth rate of 5.4% under the 11th Malaysia Plan (EPU 2015a). This is in line with objectives of the National Agrofood Policy (NAP) 2011-2020, to meet growing demand for affordable and nutritional food, and ensuring supply of raw materials for resource-based industries. Similar to trends in other developing countries, trade liberation has facilitated the availability and affordability of highly processed, nutrient-poor foods. Widespread availability of transnational food corporations in the form of westernized fast-food market further drives the pressure for demand of food sources not locally produced and manufactured. Consequently, traditional diets are being influenced and transformed to mimic these westernized fast food, calorie-rich food types. This scenario further adds to the burden on balancing national food trade figures, where it continues to see increasing deficits at an average of 8.9% from 2011-2014.

Aiding this sector requires addressing issues of low productivity, high post-harvest loss, non-optimal land use, unorganized marketing, ineffective institutional support and inadequate and low-skilled workers (EPU 2015a). Within this framework lies the opportunity to inculcate a change in mindset towards achieving food security through technology infused, sustainable and health centric agriculture. To ensure maximum effect of these initiatives, a collective effort by stakeholders involved will enable them to maximize economic benefits through effective sharing of resources, shared financing, knowledge dissemination, interaction and exchange of experiences as well as facilitating marketing and distribution. In essence, technological empowerment of agricultural cooperatives in this nature will ensure effective involvement and utilization of resources along the value chain.

BRIDGING THE GAP

Role of cooperatives

A cooperative is an autonomous alliance or "association of people, united voluntarily to meet their common economic, social and cultural needs and aspirations through jointly-owned and democratically-controlled enterprises" (ILO 2002). By virtue of functioning as a value-based and principle driven organization, this sustainable and participatory form of business ensures emphasis is given to foster democratic knowledge and practices, and social inclusion (Wanyama 2014). Furthermore, this nature allows cooperatives to be a relevant part in achieving sustainable development's triple bottom line of economic, social and environmental objectives. In its role in promoting food security and good nutrition, cooperatives allow small agricultural producers overcome remoteness and/or lack of access to information relating to market food prices; access to high-quality inputs and variable cost of buying seeds and fertilizers; access to financial instruments in purchasing these inputs; as well as access to infrastructure and transportation in rural areas (Wanyama 2014).

Historically in Malaysia, this cooperative setup played a vital role in alleviating capitalistic marginalization and oppression of smallholders in the paddy industry. With the inception of Co-operative Societies Enactment 1922, a regulatory body was put in place to administer various cooperatives that were initiated to overcome this affliction and promote greater collaboration and resource sharing among its members. Realizing its enormous role in assisting national development and growth, a national cooperative act was promulgated in 2002 and revised in 2010 to promote greater involvement of cooperatives together with private and governmental sectors in striving towards national development and growth agendas (KPDNKK 2010). As of 2015, there are more than 12,700 cooperatives registered under the Malaysian Cooperatives Societies Commission (SKM). With the involvement of 7.49 million members, this total also equates to about RM13.8 Billion (USD $3.3 Billion) in share capital and RM123.3 Billion (USD $29.4 Billion) in assets (SKM 2015).

Within that figure, 2,746 are agriculture-based cooperatives, which amounts to about 21.5% of the total cooperatives registered under SKM. In 2015, 40% or 1,107 of these cooperatives were profitable, and this translates to a total of RM1.39 Billion (USD $0.33 Billion) in acquisition and RM3.99 Billion (USD $0.81 Billion) in assets (SKM 2015). With cooperatives being strategically placed as the third engine of national economic development, agricultural cooperatives must be enhanced with not only improving management with better strategic planning and participation of its members (Mahazril, Hafizah, and Zuraini 2012), but also being able to adopt and evolve with demands of changes in its surrounding environment (Hariyoga 2004). As seen in the factors discussed previously with regards to achieving the triple bottom lines of SDG and national interests, technology input will be an important focal point to guide this growth.

TECHNOLOGY

In its latest iteration, the 11th Malaysia Plan laid out six strategic thrusts in its endeavor to transition to an advanced economy and inclusive nation. Under the "Re-engineering economic growth for greater prosperity" strategic thrust, high income generation through modernization of agriculture will be carried out with the promotion of sustainable practices and adoption of modern farming technology (EPU 2015b). Furthermore, as illustrated in Figure 4, modernization of agriculture will be carried out through 7 strategies, where infusion of smart farming technology and ICT will improve production efficiency, farm management and reduce cost of production. This is then expanded through a cluster-based approach to vertically integrate production, quality control, processing, marketing within cooperatives and associations in Agrofood supply chain.

Fig. 4. Seven modernization strategies to spur growth of agriculture sector

Research, development and commercialization (R&D&C) activities related to agricultural based technologies are carried out by various universities and research institutions in Malaysia, each with its specific goals and focus areas. Agrofood research in agriculture

excluding commodities (oil palm, cocoa, rubber) is carried out by the Malaysian Agricultural Research and Development Institute (MARDI), a statutory body established in 1969. In its role as the focal point of churning R&D&C Agrofood initiatives, modernization of the Agrofood sector will be achieved through efforts in development and dissemination of knowledge and training for quality seeds, breeds, fries and animal feed, as well as integrated pest and disease management. Higher quality seeds and effective pest and disease management especially in the paddy industry is paramount to enable higher yields as with proper training and awareness would ensure responsible usage of pesticides and other resources. The role of cooperatives here will be vital in ensuring members adhere to the latest practices as well as providing support among members and feedback to the authorities and researchers for further improvements.

Dissemination and training can also include awareness of related certifications such as Malaysian Good Agricultural Practice (MyGAP) or organic produce certifications, or food processing accreditations such as GHP, GMP and HACCP. Adoption of such certifications will elevate the standard of produce and increasing its appeal to local and international markets, as well as ensuring it complies with the objective of producing healthy food supply to the market. This growing trend gravitating towards health-conscious segment of the market also applies to the growing interest locally and worldwide in Halal market. "Halal" or permissible by Islamic laws applies to foods and products consumed by Muslims, requires strict adherence to a set of guidelines manifested in the creation of MS1500: 2009, that covers all requirements for the entire supply chain (JAKIM 2014). In relation the role of cooperatives at this juncture, training and dissemination of information, as well as financial aid in the acquisition of these certification, more smallholders through their association with cooperatives are now better equipped to attain relevancy to these growing trends.

Agriculture modernization efforts also include assisting agricultural development authorities in determining suitable and required inputs for increased productivity gains, as well as adoption of modern farm technology such as rain house shelters, fertigation system, farm automation, use of information and communication technologies (ICT) and mechanization. This will ensure effective utilization of resources such as land, water and fertilizers, as well as providing the opportunity to insert innovation of more efficient techniques such as soil or soil-less fertigation system that can ensure higher yields, as compared to conventional planting methods. Enclosed structure planting will also reduce or eliminate use of pesticides. Although requiring high startup capital, these unconventional options are feasible under a cooperative structure that provides opportunities of resource, infrastructural and finance sharing. On the other hand, implementation of ICT in the Agrofood supply chain will require a collective effort that involves support and encouragement to bridge the technological gap especially among rural stakeholders that are usually relatively less educated. Modernization of agriculture must begin with digitizing or implementation of digital technologies across the supply chain, unlocking assets for Internet of Things and big data analytics, that will allow the leap towards an Agriculture 4.0 complex within Industry 4.0.

Technological empowerment can also aid cooperatives involved with the ruminant industry, where R&D&C in genetic enhancement, improvement of breeding techniques, animal feed supply, dairy management and production facilities and implementation of Radio Frequency Identification Tagging (RFID). This will ensure that the industry is capable of improving self-sufficiency level of beef from 27.7% in 2014 to 50% in 2020, 16.1% to 24.6% for mutton and 12.8% to 13.6% for milk (EPU 2015a). MARDI is tasked with developing resilient genetic quality of indigenous cattle and goat breeds to enhance meat quality, improve fertility and increase cost efficiency. Agricultural cooperatives will play a role in providing wider access to these enhancements through training, awareness, as well as

connecting rural farms to technological centers. MARDI will also be tasked to intensify research of intensive breeding system to increase supply of high quality local breeds. Through agricultural cooperatives, increased participation of stakeholders can be achieved to develop a national database on genetic characterization of cattle and goat. This will aid breeding programs as well as providing vital genetic information for the planning of future R&D&C initiatives and policies.

As demand for rice is targeted to increase from 2.6 million tons in 2013 to 2.8 million tons in 2020, full self-sufficiency level initiatives require consolidation of small farms, technological inputs in the form of supply of high yielding varieties and provision of adequate irrigation and drainage infrastructure, as well as efficient management of performance-based subsidies (EPU 2015a). Cooperatives in the form of Area Farmers Organization (PPK) will be heavily involved in the consolidation and management of paddy fields averaging 2.2 hectares into 100-hectare estates, to reduce cost of production and benefit from related economies of scale. Cooperatives will also be tasked to voluntarily manage and maintain irrigation and drainage infrastructures. This infrastructural improvement will increase crop yield intensity from 188% in 2014 to 200% in 2020. Training, dissemination of knowledge and awareness through the cooperative mechanism will also aid successful promotion and adoption of new certified paddy varieties that are less susceptible to pest and disease attacks and improved yields. Furthermore, this effort can also be extended to equip farmers with knowledge on sustainable agriculture practices including efficient fertilizer scheduling, water management, pest and disease management, as well as the effects and mitigation steps in relation to climate change.

CASE STUDY – Area Farmers Organization (PPK) Kuala Langat

Fig. 5. A successful cooperative effort in cultivating high-valued cash crop

Source: Sinar Harian; fertigasihijau.blogspot.my

The success of PPK Kuala Langat can be used to illustrate and exemplify the dynamic nature of food consumption trend, technology and cooperative structure. PPK is part of the Farmers Organization Authority (LPP) that endeavors to improve socio-economic standards and increase skill and knowledge of its members, in order to create a progressive, independent and integrated farming community (LPP 2017). Realizing the need to improve participation of its members in the vegetable value chain, LPP Kuala Langat identified key

issues that required immediate intervention. This includes empowering its members with relevant knowledge and skillsets especially in the latest relevant techniques and technologies, harvest scheduling and post-harvest processing. Furthermore, market value of produce cultivated by its members was found to be impaired by low quality and inconsistent supply.

Established in 2012, PPK Kuala Langat repositioned itself with the aim of becoming a highly productive producer of vegetables and fruits. Under the SHAKRAN (Sharing Knowledge Replicate Approach Networking) initiative, a collection center was erected on a 12-hectare plot of land in Lot 305, Kampung Pulau Nyatoh, Bukit Jugra, Kuala Langat, Selangor, Malaysia, with the intention of developing it as a Permanent Food Producer Hub under PPK Kuala Langat. This collection center functions not only as a focal collection point of vegetables produced by its members, but also as a center to process, grade, distribute and provide information. This role also includes all marketing activities regardless of produce grades, collection and analysis of produce price information, promotion, consultation and ensuring a concerted effort is given in consistent production and supply through systematic cropping schedule.

Chili was chosen as the initial cash crop due to its high value and demand. Cultivation is done through soil or alternative soil (coco peat) polybags in a fertigation system. Because this practice is different from conventional open field farming, the need for a focal point of reference is vital to disseminate technical expertise and know-how among its members, as well as providing a standardized model or operating procedure. In this system, networking among its members is solidified with the usage of ICT tools (apps, social media) to ensure effective sharing of planting information, consultation and market insights. Members are required to cede marketing responsibilities to the management team of LPP Kuala Langat in order for them to fully focus on upstream activities. LPP Kuala Langat is then tasked to source for a network of diversified marketing opportunities that maximizes profit. Marketing outlets varies from hyper markets, wholesale markets, food producers and food outlets, as well as to the Federal Agricultural Marketing Agency (FAMA).

From its initial success, its members have grown to include other collection centers in various states across Malaysia (Johor, Melaka, Negeri Sembilan, Pahang). All produce is funneled to the collection center in Kuala Langat, and administration is centralized and managed from there. Currently, polybag capacity is at 650,000 tended by about 213 members in all five states. Since its inception, it has produced about 104 tons (as of 2016) and members have seen a 10-15% increase in farm gate price, thus providing proof of success of this project in relation to increased income generation. As stated in its future plans, by replicating this successful model, PPK Kuala Langat will look at expanding its vegetable production into producing other cash crops such as rock melons, mushrooms, as well as quail rearing and cattle breeding.

CONCLUSION

The role of a cooperative structure is apparent in amalgamating the objectives of SDG's triple bottom line and current food trends including halal, high quality and healthy supply of agricultural produce. It is apparent that an effective mechanism to empower cooperative members must be done through technology and knowledge. To achieve strategic national goals, Malaysia requires this third engine of growth to be more robust and dynamic, especially in addressing the vagaries of agricultural production and supply. Through the role of institutions such as MARDI in providing technical expertise, as well as successful value chain management experience carried out by PPK Kuala Langat, this growth can more in a trajectory that conforms to the needs of sustainability and environmental stewardship.

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