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FELDA LANDS DEVELOPMENT BASED ON SUSTAINABILITY AND HIGHEST-BEST USE APPROACH: HOW TO GO ABOUT IT?

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Abstract

Rural catalysts, specifically Malaysia's Federation Land Development Authority (FELDA) settlement schemes promise a higher future return growth and become sustainable and resilient areas. FELDA, through the implementation of a Smart Plantation Management System (SPMS), has recently moved toward modern agricultural practices to increase productivity and optimise profits for the livelihoods of its settlers. This paper attempts to discover the FELDA lands development framework based on sustainability and the highest-best use (SHBU) concept as a missing link approach to SPMS. The idea is to oversee the potential of FELDA lands, not only for crops but also for other potential possible developments comprehensively. Analyses were based on literature review, contents analysis of relevant national development policies and FELDA's *Kertas Putih* and preliminary works based on a focus group discussion (FGD). In the end, this paper offers a comprehensive FELDA lands development framework, which is timely in coping with the current issues and future potential development crop lands and FELDA settlements, with the aim to bring profits and prosperity to its settlers and all nations.

Keywords: FELDA; Sustainability, highest and best use, Smart Plantation Management System (SPMS), Resilient

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INTRODUCTION

Rural area is safeguard lands for a sustainable living environment and generate wealth. In Malaysia, there are many fertile areas, in particular FELDA lands, which have the potential for a higher return in modern agricultural, industry and business sectors. With vast agricultural lands, FELDA can be a leader in the large-scale food industries either for local consumers or for exports. For this to take place, FELDA needs to play a key role in promoting and generating various rural economic activities to close the gap between urban and rural areas (FELDA, 2016), and to uplift FELDA itself towards sustainability and resilient settlement schemes.

Presently, there is a substantial number of FELDA households with a lower income (Government of Malaysia, 2019). This may be caused by multiplicative factors of unproductive crops activities, commodity's market volatility, lack of reform strategies, high debt and many other related issues, as mentioned by the Minister in the Prime Minister's Department (Economy) Datuk Seri Mustapa Mohamed in his speech on the FELDA recovery plan, as recorded in the Sun daily (2021). Due to this circumstance, there is a need to find interventions and solutions to enforce, especially the potential FELDA lands towards the highest and best use of land with a higher return to enhance the quality of life and liveability of its settlers and the nation. The ongoing national development policies such as *Dasar Perancangan Fizikal (DPF) Desa Negara 2030* (launched in 2017), which is Malaysia's first form of rural-national spatial development policy, *Dasar Pembangunan Luar Bandar (DPLB) 2030* (in 2018) and the most recent is the Ten-Years National Blue-Print of *Wawasan Kemakmuran Bersama (WKB) 2030* (in 2019) offer strategies and tools to synergise rural change and social well-being aligned with the Sustainable Development Goals (United Nations, 2020), and the digital economy and technologies that become worldwide challenges and opportunities.

FELDA, by itself, has introduced a blueprint, the so-called report of *Kertas Putih*, which enforces a new direction of sustainable FELDA development in the future (Government of Malaysia, 2019). Through the *Kertas Putih*, two main catalyst projects were introduced, namely: (a) the Settlers Development Programme (*Program Pembangunan Peneroka - PPP*) with the aim to generate additional income to settlers and support the national food security initiative; and (b) Smart farming initiative via Smart Plantation Management System (SPMS). The implementation of both is still at a pilot stage and opens a venue for intervention.

Inspired by this, the current paper attempts to discover the FELDA lands development framework based on sustainability and the highest-best use concept as a missing link approach to the PPP and SPMS. The idea is to oversee

the potential of FELDA lands, not only for crops but also for other potential possible developments comprehensively.

FELDA, PROGRAM PEMBANGUNAN PENEROKA AND SMART PLANTATION MANAGEMENT SYSTEM

Strategic Issues of FELDA Lands Development

The Federal Land Development Authority (FELDA) was established in 1956 under the Land Development Ordinance (1956). It is a fact that the establishment was mainly as a result of a paradigm shift in the agricultural development policies that took into account the special needs of rural communities alongside the national development agenda (Mamat et al., 2016) through the cultivation of crops such as rubber and oil palm (Okposin et al., 1999). The main objectives of FELDA are to overcome the landless and unemployment problems as well as to increase rural income and to improve the living standard in rural areas. Lurah Bilut was the first FELDA settlement when it was first launched in the year 1958. It is a resettlement and rehabilitation scheme to eradicate poverty (Ariffin & Hussin, 2015) by transforming forests into productive agricultural farms to maximise yield (Hussin & Abdullah, 2012). The amendment of Land Development Act 1956 (Act 474) and Land Act (Clustered Settlement Area) 1960 (Act 530) has diversified the main functions of FELDA such as to assist, guide, advice, manage and coordinate activities of economic, social, settlement, agriculture, industry as well as commercial. As it grows, nowadays, there are approximately more than 400 FELDA settlers covering about 16% of the entire Malaysia area.

Today, the FELDA scheme has changed the livelihoods of the landless participants with the provision of housing, employment and income, and by becoming the owner of valuable land (Barau & Said, 2016) that created a widespread scatter of 'urban villages' (Mamat et al., 2016). After 50 years of operation, the agency has transformed itself from being an agricultural leader to a global corporate player (Mohamad et al., 2014). In line with the aspiration for its existence, FELDA maintains a proactive role, particularly in the planning, generation, and implementation of land development strategies through plantation projects and other socioeconomic programmes in rural areas (Din et al., 2020).

However, there are FELDA households with a lower income due to many factors. As reported in *Kertas Putih*, the strategic issues of FELDA that need further actions, such as, limited housing for second and third generations, and critical issues of settlers and new generations in sustaining their living and engaging in FELDA projects with unstable monthly income due to fluctuation of commodity prices and limited job opportunities, are the abandoned. Therefore, FELDA introduces *Program Pembangunan Peneroka* (PPP) that aims to generate

additional income for settlers and support the national food security initiative. Currently, the programme involves 317 FELDA settlements with approximately 112,638 settlers nationwide (Shahrudin, 2021). Another catalyst project is a smart plantation system (SPMS) initiative to maximise profits through monitoring plantations with the help of GIS and other related technologies. Both initiatives open new opportunities and provide the potential to intervene in FELDA development strategies.

Introduction to PPP and SPMS and Called for SHBU

PPP and SPMS are two catalyst initiatives in *Kertas Putih*, with the main goal of revitalising FELDA into a new chapter of transformation in terms of their fundamental issues and prospects. Both are very significant initiatives to ensure the sustainability of FELDA as a national rural catalyst development to improve the livelihoods and prosperity of settlers and their new generation (see Government of Malaysia, 2019).

Through PPP, it is estimated that each participant of this programme will get an additional monthly income in the range of RM500.00 to RM1000.00. This programme is divided into two concepts of participation, either individually (Plasma Category) or through cooperation (Cooperation Category). The fund allocated for PPP is RM1 billion. PPP is going to focus on cash crops (such as MD2 pineapple, fertigation chillies and young ginger, etc.), aquaculture, and livestock on the identified areas or spaces at settlers' housing lots or vacant lots at the FELDA settlement area. These projects are given based on several criteria such as the preference of the participants, expected high additional income to participant, minimal usage of land area and technical expertise of FELDA. The project will be awarded to a participant in terms of a grant worth a maximum of RM10,000.00 or more for Plasma Category, and RM20000.00 or more per participant for Cooperation Category. Currently, there are 3202 approved projects which are worth RM58.3 million (Shahrudin, 2021).

Meanwhile, SPMS is a crop smart management system developed by FELDA Research and Development Department (R&D) that is based on Geospatial Information System (eGIS) to manage and monitor the palm oil estate efficiently. Currently, there are 26 FELDA settlement schemes throughout Malaysia that have been monitored by the SPMS application which is still in Phase 1. SPMS uses drone technology and satellite images for high-resolution images to screen and measure the performance of palm oil trees for monitoring and cost-efficiency purposes. There are three main views of outputs that will be produced, which are, trees points, vacant points, and unhealthy points. These views assist in monitoring the numbers of existing trees by estimating the use of fertilizer to avoid wastage or shortages of it. SPMS images can also be used to identify the exact locations of vacant plots, thus assisting workers in preparing

for crop replating. The third function of SPMS is detecting unhealthy trees. By doing this, it would provide information to workers to monitor and treat the trees accordingly before the spread of the tree disease. The application of SPMS would efficiently save FELDA from unnecessary operational costs where the estimated saving is expected to be RM43 mil/year and an approximate RM23 mil/year would also be saved on fertilization cost (Shahrudin, 2021).

Therefore, based on the above discussion on this issue, there is a gap found that needs to be fulfilled to cater to shortfalls in both projects, especially on lands selection decision making, high-crops scenario planning and measurement and supportive intervention strategy formulation. The PPP, for example, is currently only implemented on a basis of settlers' preferences on their own spaces without land allocation or suitability land analysis for the entire settlement scheme. Furthermore, comprehensive planning of physical-support systems such as a business centre, crops collection hub, and so on, is required. Moreover, SPMS is undoubtedly an outstanding system that enhances the management of estates and crops. However, FELDA is still in a dire need of comprehensive support to ensure sustainability and the highest-best use for crop lands development. For this reason, the focus of this present study is not only on monitoring and managing the current crops, but also on finding solutions to the fundamental issues and prospects of land development and the well-being of FELDA communities that rely on the crops land development-based economy. With this, the study shall fulfil the gap through the introduction of the SHBU framework.

METHODOLOGY

The study explores the SHBU framework based on three main research approaches namely literature review, contents analysis of relevant national development policies and FELDA's *Kertas Putih*, and preliminary works based on a focus group discussion (FGD) and special sessions with FELDA representatives.

The literature review focuses on the concepts and approaches of sustainable and contemporary lands development and best practices of highest-best use that are relevant to FELDA transformation. Moreover, the content analysis involves three identified reports or documents, namely, *Dasar Perancangan Fizikal (DPF) Desa Negara* (2017), *Dasar Pembangunan Luar Bandar (DPLB)* (2018) and FELDA's *Kertas Putih* (2019). Both processes help in building a conceptual understanding of FELDA lands development based on the real issues and are incorporated with sustainability and highest-best use approach and setting domains or dimensions for FELDA lands development framework.

Finally, the FGD and special sessions were conducted to obtain first-hand information and fundamental issues regarding FELDA development and their feedback towards the proposed framework. The FGD was conducted on 29 June 2021 via an online Google Meet participated by eight representatives from FELDA. They comprised four first-generation and three second-generation FELDA settlers and a head of division official from FELDA headquarters. Then, there were two special sessions with the representatives from FELDA management office: (a) FELDA Lands Management Office and head of *Program Pembangunan Peneroka*, and (b) eGIS and R&D departments. The special sessions were conducted on 28 July 2021 and 24 August 2021 respectively, via online Google Meet. All related information was then transformed into a thematic analysis and interpreted accordingly to validate the formulation of the SHBU framework.

RESULTS

A Defined Concept of Sustainability and Highest-Best Use for FELDA Lands Development

This study attempts to integrate sustainability and highest-best use into a new development theme, the so-called sustainability and highest and best use (SHBU) to synergise FELDA for a change. The sustainability concept is crucial to realise the co-existence of the FELDA in the future to stimulate both social and economic development without compromising the environment. In its richest means, sustainability is the ability to continue certain development progress indefinitely as the Brundtland Commission defined it as the ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED, 1987). Thus, despite a major disturbance or challenge, it is capable to maintain productivity with the adaptation to a new mechanism. Sustainability would then ensure that FELDA become a resilient organisation in promoting the prosperity and social-wellbeing of its settlers and the stability of rural development trends in the long run in the capacity of economic, social, technology and environmental systems to cope with change, in both foreseeable situations and unexpected disturbances (Knickel et al., 2018).

Meanwhile, the highest and best use (HBU) is a concept that originated from early economists such as Irving Fisher (1867-1947), who conceptualised the idea of maximum productivity. In a simple understanding, the HBU of lands development can be defined as the highest profits (returns) or satisfaction gaining from the productive lands for crops at a specific point in time. In a macro perspective, it is an income-based and measurable value, such as, increase in land value, diversified uses of lands with higher potential products, productivity and market price, high-value processing activities and other relevant elements with value attributes. Theoretically, HBU must be interpreted in the context of most

probable or most fitting use and is often consistent with definitions of the time. An area of land may be at its highest and best use when it provides the optimum return to its owner or user, which could be measured in monetary terms, or in intangible and social values, or a combination of such values. The HBU is the use of the most possible and optimal of an asset, which is physically possible, has been adequately considered, legally permitted, legally financially viable, has sufficient support, and is financially feasible and produces the highest value (Akmaludin & Utomo, 2013; Utomo et al., 2018; Fitriani, 2019).

SHBU based on Five-Dimension-Objectives Measure

Drawn from the above-defined concept, this research proposes the SHBU concept in rejuvenating and synergizing FELDA for change reflecting the prospects and fundamental issues in the settlements. By working on the literature and synthesising the available national policies and strategies, Figure 1 demonstrates a conceptual framework of the SHBU approach based on a five-Dimension-Objectives Measure, namely: FELDA industries-based crops (FibC) and SHBU plan management (SPM) from the HBU domain; and the remaining FELDA business centre (FBC), FELDA residential compound (FRC) and FELDA agro-preneur (FAGP) are from the sustainability domain.

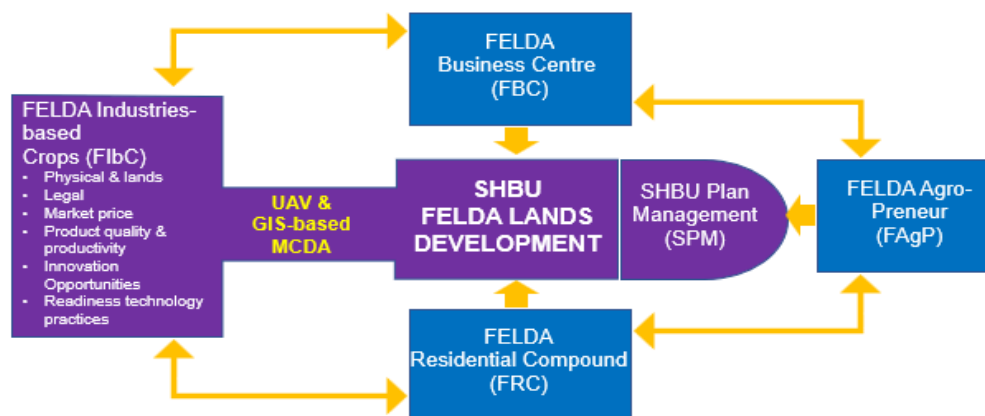


Figure 1: Five-Dimension-Objectives Measure-based SHBU Framework for FELDA lands development

The framework with a symbiosis of five dimension-objectives measure is said to be a strategic and comprehensive approach in realising the SHBU of FELDA lands development in the near future. To put it up front with the current demand, the Unmanned Aerial Vehicle UAV and GIS-based Multicriteria Decision Analysis (MCDA) approach is linked to the SHBU framework to conduct geospatial analyses for classifying lands potential levels and estimating

HBU returns based on what-if scenarios. Table 1 provides a detailed explanation of each dimension regarding their functions and main intentions or expected outputs.

Table 1: Five-dimension objectives measure and their descriptions

No.	Dimensions	Main Intention
<i>HBU Domain</i>		
1	FELDA Industries-based Crops (FibC)	To propose future potential crops (also integrated agricultural development) securing a medium and long term higher-best profit – with an income-based and measurable based on the UAV and GIS-based MCDA approach and HBU elements such as product quality and productivity, innovations, technology practices and so on.
2	SHBU Plan Management (SPM)	To set up a task force unit representative from FELDA officers and other FELDA actors to make SHBU plans implementable or executable to deliver good results/profits.
<i>Sustainability Domain</i>		
3	FELDA Business Centre (FBC)	To strengthen FBC as a catalyst development of FELDA settlements that is linked to industrial-based crops and community needs. This also involves a geospatial analysis for identifying a new FBC based on the UAV and GIS-based MCDA approach and lands suitability criteria.
4	FELDA Residential Compound (FRC)	To promote sustainable residential and resilient-liveable community for FELDA second and future generations. It also involves a geospatial analysis based on the UAV and GIS-based MCDA approach and lands suitability criteria.
5	FELDA Agro-Preneur (FAgP)	To equip FELDA settlement and younger generation with Agro-Preneur facilities and support systems towards multi-sources of income – linked to the main crops (upstream activities). It also involves geospatial analysis based on the UAV and GIS-based MCDA approach and lands suitability criteria.

In short, UAV and GIS allow for the assessment of the effectiveness of land suitability for development decision-making, i.e., agricultural and others with the advantage of acquiring data in a short period and giving a high-resolution image (Niluka et al., 2016; Franceschini et al., 2017; Norasma et al., 2019). It is a current demand in the agricultural sector where the Association for Unmanned Vehicle Systems International (AUVSI) posits that 80% of the UAV technology is going to apply in agriculture, thus indicating a crucial role in the development of the agricultural sector (Radoglou-Grammatikis et al., 2020). This is to say that the integration of the UAV and GIS-based MCDA generates an excellent analysis tool that allows for the creation of an extensive database and decision making

(see Malczewski, 2004; El Sayed, 2018) and would avail the building of the SHBU framework.

To materialise this, the SHBU framework puts the Plan Management (SPM) dimension as a second measurement factor to assign main actors (as a task force) for making plans implementable or executable and to monitor the delivery of good results and profits. It is important because as highlighted in DPF *Desa Negara 2030*, good governance plays a key role in bringing about or inhibiting change and transformation in the rural development ecosystem. The remaining three dimensions of sustainability are also crucial in making FELDA sustainable for future continuity and in playing a role in the prosperity of rural areas. All dimensions have gone through a review and validated based on an FGD and special sessions with the representatives of FELDA. This shall be further discussed in the following section.

PRELIMINARY FEEDBACK ON SHBU AND DISCUSSIONS

The proposed SHBU is said to be a comprehensive FELDA lands development framework to cope with the fundamental issues and future prospects. Based on an FGD and special sessions with the representatives of FELDA, it shows that the five-dimension objectives measure, namely, **industries-based crops (FibC) and SHBU plan management (SPM) from the HBU domain; and the remaining FELDA business centre (FBC), FELDA residential compound (FRC) and FELDA agro-preneur (FAGP) from the sustainability domain, are well tallied** to the SPMS progress towards maximising crops returns through the digital database (eGIS) and technology practices, and PPP to improve settlers' income, prosperity and social well-being. This is illustrated in Figure 2 where it links the SHBU framework with both catalyst projects of FELDA. As previously stated, the proposed framework has been subjected to preliminary feedback or a validated process based on an FGD and two special sessions with FELDA representatives. All inputs were then summarised, clustered and produced in written reports. The key points or current situations of the synthesised findings supporting each of the proposed five SHBU dimensions are as follows.

- Every FELDA estate land must be planted only with rubber and palm oil commodities. Currently, only a few lands are considered not productive because of the unproductivity of settlers, and about 70% of the crops land is far from home and difficult to access. In addition, there are available spaces for interim crops, e.g., high-tech crops like kenaf, Guarana and vanilla during the replanting period.
- New physical development such as business centres, residential compounds need to be given extra attention because these human resources are the driving force for the progress of FELDA.

- The lack of second-generation occupancy in the FELDA scheme is due to limited residential opportunity. This affects the efforts to develop FELDA’s estate because FELDA alone cannot be expected to manage without the involvement of the second generation. There is approximately 10% of the lands in the scheme reserved for economic projects. The land is under the jurisdiction of the State Government. A pilot housing project by FELDA, the so-called *Perumahan Generasi Baharu FELDA* (PGBF), has been undertaken and is at least 70% nearing completion.
- There is a need for FELDA Agro-Preneur to cater to the issues of side income generation for settlers, particularly the new generation. It is a part of PPP initiatives.

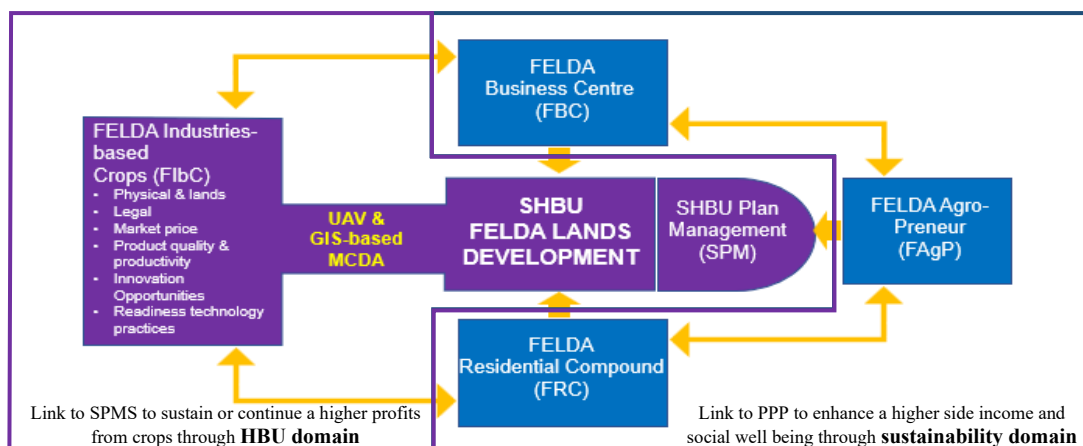


Figure 2: SHBU as a missing link approach to SPMS and PPP in realising FELDA transformation

From the above discussion, it is proven that that it is timely for this study to cope with the planning for future potential development crops lands and FELDA settlements in accordance with its direction proposed in the *Kertas Putih*. As included in the SHBU framework, the feedback also supports a need to set up a special task force or SHBU Plan Management Unit to do planning, execution, and monitoring stages to make it prosper in achieving the target aim (*Kertas Putih*). To achieve this, the SHBU shall include added values to the current initiatives. According to Walacik et al. (2020), the sustainability approach can create an added value and be dependable for future progress. Furthermore, based on the HBU approach, FELDA has the potential to diversify its agriculture industry by focusing on a variety of crops other than rubber and oil palm, thereby avoiding national reliance on a single crop (Sarena Che Omar, 2020). OECD (2012) in its ‘Environmental Outlook to 2050’ emphasises on the consequences

of inaction in resuming business which will have adverse and costly impacts on human well-being, security and economic growth, thus fundamental changes are needed. It is hoped that SHBU with the application of GIS-based MCDA approach (as a spatial decision problem tool) would lead to reconfigure these through R&D and innovation and adopting new practices (Figure 2).

Moreover, Rashid et al. (2021) and Sumane et al. (2018) emphasise that the transition towards more sustainable agriculture as well as modern agriculture will require a new knowledge base, particularly in digital technology, with new contents and knowledge experiential, while not dismissing the importance of farmers' informal knowledge. Knickel et al. (2018), based on their empirical research, confirmed that technological innovation is very important, and it cannot readily be separated from organisational at the farm, food-chain or market level. It is due to the fact that technological advancement is one of the decisive factors responsible for the increase in the productivity and output of crops (Mamat et al., 2016). It is also easier to adapt to and comprehend situations such as disruption, change, and crisis as part of the development process (Gabella & Strijker, 2019). It is, therefore, anticipated that the SHBU framework will be the appropriate missing link approach or future intervention strategy in synergising FELDA for change.

Hence, the elements of the SHBU will be transpired in the land suitability analysis based on GIS-based MCDA. Then, the strategies will be formulated to reflect national rural policies that resonate with the Sustainable Development Goals (United Nations, 2020). The outcome should enable FELDA to sustain the highest return in more comprehensive forms, not only in terms of the income of current settlers, but also the next generations of FELDA communities.

CONCLUSIONS

This paper has introduced SHBU framework for FELDA lands development - a missing link approach to the existing FELDA blueprint – particularly the PPP and SPMS. Specifically, SHBU is aimed at synergising FELDA transformation towards improving settlers' livelihoods by fully utilising FELDA lands and human resources for optimising profits at its best. The sustainability and SHU concepts are not new, but this study integrated them into five dimension-objectives measure which is tailor-made to the prospects and fundamental issues of the FELDA development. This is done to diversify the economic catalysts in the settlement schemes by crops-based industries and agropreneurs as the economic themes, together with physical-infrastructure-services elements (e.g., a business centre and residential compound as support systems), and strategic governance unit to monitor at the execution and management level.

Worthy to note, this paper contributes to the process and cast ideas on the pathways of FELDA development in the challenging digital era. It is high time to cope with the current issues and future potential development crops lands, and FELDA settlements, to bring profits and prosperity to its settlers and the whole nation.

However, the outcome of this study is only at the conceptual idea stage; thus, for future research, an empirical study needs to be undertaken for a better insight on this issue. It shall be demonstrated in future publications.

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