Akademika 91(Isu Khas), 2021: 145-156

https://doi.org/10.17576/akad-2021-91IK-13

The Role of Social Media Applications in Palm Oil Extension Services in Malaysia

Peranan Aplikasi Media Sosial dalam Khidmat Pengembangan Sawit di Malaysia

Tan Say Peng, Novel Lyndon, Khairuman Hashim & Zaki Aman

ABSTRACT

The Malaysian palm oil industry faces many challenges, especially in agricultural technology at the plantation level because smallholders have trouble getting detailed information and the latest data on the palm oil industry issues. More efficient extension services are needed in meeting the need to increase knowledge. Information and Communication Technology (ICT) is the best method to accelerate agricultural technology transfer from research institutions to smallholders. Growing concerns about the impact of the covid-19 pandemic on health have prompted development agents to change the course and landscape of their delivery to social media application as a new norm socialisation agent. The study aims to examine the role of information and communication technology as a tool for developing new norms in conveying information and empowering smallholders' knowledge. This study uses a qualitative approach through content analysis on several reports from the Malaysian Palm Oil Board (MPOB), Department of Statistics Malaysia (DOSM) and the Malaysian Communications and Multimedia Commission (MCMC). The study found that the use of social media platforms among Malaysians is high, thus the level of application of technology and palm oil information needs to be improved through social media applications. The government needs to develop social media applications that are friendly, easily accessible and the information presented is easy to understand. The implication of this study is that the use of information and communication technology will change the pattern of expansion of the palm oil sector in Malaysia in the future.

Keywords: Smallholder; extension services; smartphone; social media; oil palm

ABSTRAK

Industri sawit Malaysia menghadapi banyak cabaran terutama sekali dalam konteks penggunaan teknologi pertanian di peringkat ladang. Hal ini kerana para pekebun kecil menghadapi masalah mendapatkan maklumat terperinci dan data terkini tentang isu-isu yang melibatkan industri sawit. Oleh itu, untuk menyelesaikan cabaran pengeluaran, khidmat pengembangan yang lebih efisien amat diperlukan terutama sekali dalam memenuhi keperluan untuk meningkatkan tahap pengetahuan pekebun kecil sawit persendirian. Teknologi Maklumat dan Komunikasi (TMK) merupakan kaedah yang terbaik dalam usaha untuk mempercepatkan pemindahan teknologi pertanian daripada institusi penyelidikan dan pembangunan kepada pekebun kecil. Sementara itu, kebimbangan yang semakin meningkat mengenai impak pandemik covid-19 terhadap kesihatan telah menyebabkan agen pengembangan telah mengubah landasan dan landskap penyampaian mereka kepada penggunaan media sosial sebagai agen sosialisasi norma baru. Objektif utama kajian ini ialah untuk meneliti peranan teknologi maklumat dan komunikasi sebagai alat pengembangan norma baru dalam menyampaikan maklumat dan memperkasakan pengetahuan para pekebun kecil. Kajian ini menggunakan pendekatan kualitatif melalui analisis kandungan terhadap beberapa laporan daripada Lembaga Minyak Sawit Malaysia (MPOB) Jabatan Statistik Malaysia (DOSM) dan Suruhanjaya Komunikasi dan Multimedia Malaysia (MCMC). Hasil kajian mendapati penggunaan platform media sosial dalam kalangan penduduk Malaysia adalah tinggi. Kajian juga turut mendapati tahap penerapan teknologi dan maklumat sawit perlu ditambah baik oleh pekebun kecil melalui aplikasi media sosial. Kesimpulan kajian ialah kerajaan perlu membangunkan aplikasi media sosial yang mesra pekebun kecil, mudah dicapai dan maklumat yang disampaikan mudah difahami. Implikasi kajian ini ialah penggunaan teknologi maklumat dan komunikasi akan mengubah corak pengembangan sektor sawit di Malaysia pada masa hadapan.

Kata kunci: Pekebun kecil; khidmat pengembangan; telefon pintar; media sosial; sawit

INTRODUCTION

The Malaysian palm oil industry plays an essential role in the agricultural sector's gross domestic product (GDP). In 2019, it contributed RM64.84 billion or 4.76 percent to GDP (Parveez et al. 2020). With the growth of the global population and income, the global market is expected to expand from the increasing biofuels' output, accelerating economic growth and increasing applications in various markets, particularly in developing economies. Palm oil production is crucial to the Malaysian economy – after Indonesia, the country is recognised as the world's second-largest producer of this commodity. In the Malaysian economy, the Malaysian palm oil industry has played a crucial role. The area planted phenomenally has grown from 55,000 ha in 1960 to 5.90 million hectares in 2019. Palm oil production has also increased dramatically as the fields have grown, from less than 100,000 MT in 1960 to about 19.86 million MT in 2019 (Parveez et al. 2020).

Smallholders are defined as those who own less than 40.5 hectares of land. As of December 2019, Malaysia has 258,657 independent smallholders (ISH), covering 986,331 hectares (Table 1) (MPOB 2020). The smallholder sector is a small-scale production entity (Peng et al. 2019). Therefore, this sector is commonly viewed as inefficient and unproductive compared to the estate sector as a large-scale production system (Peng et al. 2019). Nonetheless, small farmers' presence is essential and has played a significant role in the palm oil industry's development (Peng et al., 2019). This industry is a significant income source for smallholders because it helps eradicate poverty and enhances social mobility. Independent smallholders cultivate almost 17 percent of Malaysia's 5.90 million hectares of oil palm plantations (Parveez et al. 2020). Smallholders with an average area of 3.9 hectares will have a monthly net income of between RM2, 000 and RM2, 100 (Post 2018). These smallholders are usually from the 'Bottom 40 Percent' (B40) population income group (Post 2018). More efficient extension progammes are also required to tackle farm management issues, including meeting the knowledge needs of poor smallholders in this country. Besides, experts and organisations worldwide in agricultural extension encourage extension agents and educators to adopt ICT (Tata and McNamara 2016). Social media, a popular ICT tool, has excellent potential for knowledge sharing and social networking among smallholders. Nevertheless, much scepticism exists about its use in farm extension activities, making it imperative to practise its current use in sharing farming-related information. Further, ICTs encourage agricultural technology implementation by encouraging the education, disserting problem and competitive accessibility of farmers' markets to their crops (Tata and McNamara 2016).

TABLE 1. Distribution of registered Independent's Smallholders (ISH) in Malaysia as of 31 December 2019

State	No. of ISH	Area (Ha.)
Johor	80,634	226,113
Kedah	6,565	28,401
Kelantan	2,209	6,898
Melaka	3,094	12,970
Negeri Sembilan	6,002	26,998
Pahang	13,877	52,987
Perak	47,184	125,063
Perlis	34	164
Pulau Pinang	1,847	9,240
Selangor	20,975	42,016
Terengganu	3,630	12,659
Sabah	32,156	209,624
Sarawak	40,450	233,198
Malaysia	258,657	986,331

Agricultural extension services are currently facing several new and complex challenges. Social media can play a key role in improving connectivity and knowledge flows between various stakeholders involved in agricultural innovation and the thriving growth of agriculture and advisory services agencies (Kipkurgat, Onyiego & Chemwaina 2016). Knowledge, guidance, and coaching are essential at the local level for rural producers and other food chain actors (Šūmane et al. 2018). As a trusted rural communication and education institution, social media is a vital emergency response to such a crisis, offering pandemic information and supporting farming advice to deal with various shocks (Davis 2020). Although they manage their crops independently, independent smallholders do not entirely lack government support (Tang & Al Qahtani 2020). The Malaysian Palm Oil Board (MPOB) provides formal and informal training to impart technological competencies and awareness of sustainability through the TUNAS guidance and advisory service programme (*Tunjuk Ajar dan Nasihat Sawit*) to smallholders such as the TUNAS progamme engaged in Perak and Sarawak (Awang et al. 2016; Ibrahim et al. 2018). Therefore, the main objective of this study is to examine the role of information and communication technology as a tool for developing new norms in conveying information and empowering smallholders' knowledge.

LITERATURE REVIEW

THE CONCEPT OF AGRICULTURAL EXTENSION

In the 21st century, agricultural extension is expected to be surrounded by problems associated with agriculture's development and its contributions to sustainable transformation. Therefore, new capacity is required for different extension and advisory services to address the current challenges, enabling them to make a significant contribution to improving agricultural innovation (*Wan Fariza Alyati Wan Zakaria & Jabal 2021*). The transition of new knowledge from scientific research to agricultural practise through agricultural education is an extension of agriculture (Ahmed Awad Talb Altalb, Tadeusz Filipek, Mwangi & Ahmed Awad Talb Altalb, Tadeusz Filipek 1998). The extension services provide a broader range of communication and learning activities coordinated for rural farmers by extension staff from different disciplines (including agriculture services, agricultural marketing, health and business studies) (Banerjee 2011). Agricultural extension services include the transfer of knowledge to farmers and providing advice and education to farmers in the decision-making process, enabling farmers to specify their targets and resources and promote ideal agricultural development (Fu & Akter 2016). Diffusion studies show agricultural extension staff how to communicate new technologies with farmers. This approach theory was the "diffusion of innovation" model introduced by Rogers et al. (2019). Smallholder extension services remain at the centre of the supply chains for agricultural and food in developing countries. (Tata and McNamara 2016).

Agricultural extension progammes are used worldwide, with over 90% of public extension agents operating in developing countries such as China alone which is estimated to have more than 600,000 extension agents, while there are 90,000 (India), 54,000 (Indonesia) and 46,000 (Ethiopia) (Hu et al. 2012; Swanson and Davis 2014). Agricultural extension services are a vital way for farmers to acquire the knowledge, information and technology needed for improving productivity, increasing food security and the quality of their livelihoods (Pandey & Kumari 2018; IFPRI 2020). Extension offers a vital support service for rural producers to address the agricultural sector's emerging challenges: the transformation of the global food and agricultural system, including the growth of environmental and sustainability problems, the degradation of the natural resource base and climate change (Davis & Heemskerk 2012). However, extension alone will not bring millions out of poverty unless there is a proper combination of policies, technology, and business opportunities.

Agricultural extension spreads information from research to farmers by accelerating knowledge transfer and enhances farmers' choices leading to agricultural growth and higher incomes (Anderson & Feder 2004; Anderson 2007). Nevertheless, the 'Indian Agriculture 2039' vision, however, also focuses on enhancing agricultural activities' efficacy, including agricultural research and extension services. (Binswanger-Mkhize, Mukherjee and Parikh 2012). Farmers, farmers' organisations, and other market participants can acquire expertise, information and technology through extension and advisory programs. Besides that, extension services programmes can promote the relationship between smallholders and partners in science, education and

agribusiness (Davis & Heemskerk 2012). Originally, agricultural service delivery in developing countries started with production-oriented services with limited extension services for export crops. However, agricultural extension agencies have received substantial support in developing countries from international development organisations such as the World Bank and the Food and Agriculture Organization of the United Nations (Waithaka 2001). Since then, the increasing demand for agricultural services has led to the development of various approaches, models and methods for linking researchers, extension agents, farmers and consumers (Gershon Feder, Just & Zilberman 1984; Anderson & Feder 2004). The most popular approaches are the World Bank-sponsored Training and Visit (T&V) extension model and the Farmers Field Schools (FFS) approach (Anderson 2007; G. Feder, Murgai & Quizon 2008). Extension staff relay information to individual contact farmers who exchange information with other farmers in the T&V and FFS programmes (Anderson & Feder 2004). Extension services have generally been recognised as a vital element of agriculture, but small and disadvantaged farmers in remote villages remain beyond the scope of adequate services. Agricultural extension has increasingly shifted from the conventional focus on technology transfer and farm management expertise to a broader public and private advisory service mode to solve problems such as marketing, environmental protection, diagnosis of pests and risk management (Norton & Alwang 2020). However, only a little progress has been seen, even though traditional public-sector extension systems use different extension programmes to address challenges by implementing technology (Anderson & Feder 2004; Aker 2011). Therefore, extension is a communication process and the connection and exchange of information between various participants and stakeholders are necessary for sustainable agricultural development (FAO 2010). There are three types of methods that can be used for agricultural communication: face-to-face instruction, product training (such as manuals and videos) or ICTs (such as radio, short message services (SMS)) and social media applications (Tambo et al. 2019).

INFORMATION AND COMMUNICATION TECHNOLOGY FOR AGRICULTURAL EXTENSION

ICT can be defined as a set of various technical tools and resources used to communicate, broadcast, deposit, and handle information includes computers, the internet, networking hardware and software, satellites, broadcasting technologies (radio and television), and telephony (landlines and cellular) (Banerjee 2011). It also requires services and functions linked to it—for example, web portals, email, SMS, video-conferencing and etc. In short, information technology promotes the exchange of knowledge (Banerjee 2011). Structural changes in agriculture, emerging new types of agricultural technologies, tight public budgets, government decentralisation efforts, and ICT have led to pluralistic. Farmer groups and virtual networks play a growing role in technology diffusion, and extension services can exploit these networks using the current ICT approaches (Norton & Alwang 2020). In response, agriculture extension experts and research institutions worldwide have promoted ICT to improve agricultural technology adoption by supporting farmer learning, problem-solving, and accessibility to profitable markets (World Bank 2011).

Several research findings also mentioned that ICTs have improved poor smallholder farmers' productivity and livelihoods (Munyua, Adera & Jensen 2009; Marlyna et al. 2019). Thus, more effective extension services are needed to address agricultural challenges, including meeting the information needs of poor smallholder farmers in developing countries (Aker 2011). Research and extension activities play a significant role in adopting any agricultural technology among growers (Ashraf, Shurjeel & Iqbal 2018). The need is that extension staff must frequently participate in farmers' activities and play a key role in teaching and disseminating information and communication technology (Ashraf, Shurjeel, & Iqbal 2018). People should not ignore the advantages of information technology in this information era. Learning new technologies is profitable agricultural production methods in their language can enable farmers to implement advanced practises and improve their agricultural production (Tantisantisom 2011; Ashraf, Shurjeel & Iqbal 2018).

In developing countries like Malaysia, palm oil is a significant contributor to GDP, and it cannot be ignored in an era of rapid transformation. Information technology's role is that users need real information, in the legitimate form, at the right time. Generating and applying agricultural knowledge is becoming increasingly important, particularly for small and marginalised farmers who need relevant information to develop, sustain and diversify their farms (Pandey & Kumari 2018). The internet is a global mass medium, which may reach everyone in the world (Ohiagu 2011). The use of information technology is an essential pillar for agricultural extension, as Jones (1997) stated.

THE CONCEPT OF SOCIAL MEDIA

Social media refers to interactions between people in which they make, share, or exchange information and ideas and allows the "creation and each angel of user-generated content" (University 2021; Kaplan & Haenlein 2010). Social media has changed the way we communicate, read, search, think, talk, watch, listen and sometimes start a revolution – be it political and/or social (Bhattacharjee, 2016). Social media platforms have penetrated deeply into the mechanics of everyday life, affecting people's informal interactions, as well as in situational structures and professional routines (van Dijck & Poell 2013). The ICT based extension delivery mechanism is growing as an innovative extension delivery mechanism with the convergence-based farmer-friendly diversified crop, enterprise-specific, and market-led extension delivery mechanism in the last decade all over the world (Thakur et al. 2018).

Social media is more about sociology and information psychology than technology. (Raj & Bhattacharjee, 2014). Using social media platforms such as Facebook, WhatsApp, Twitter, YouTube, and blogs for uploading and sharing information, including creating online profiles, making comments or chatting, posting photos and videos, or 'liking' other people's posts, exchanging links, marking photos and materials, creating and sharing game modifications, and remixing or updating existing content (Kipkurgat, Onyiego & Chemwaina 2016; Ahmed et al. 2019). As described by Kellogg (2020), the major seven social media websites that are gaining popularity worldwide are Facebook (2.45 billion+), Twitter (330 million+), LinkedIn (310 million+), Instagram (1 billion+) and Snapchat (360 million+) YouTube (1 billion+ unique monthly users), Google+ (500 million+) in the year 2020.

THE ROLE OF SMARTPHONE IN AGRICULTURAL EXTENSION

Smartphones are unique to contemporary cell phones (basic phones) (Lazim and Sasitharan 2014). Basic phones are the only suite for sending text messages and voice calls. Simultaneously, smartphones allow users to change their device's function by downloading apps that convert their smartphone into a navigator, dictionary, staff scheduler, and digital camera, making them the super user (Böhmer & Krüger 2013). As customers see smartphones as a necessity, they feel like they are too dependent on their smartphones and have a strong tendency for continuous use that makes the smartphone an integral part of their daily lives (Tian, Shi & Yang 2009). A study by Lazim and Sasitharan 2014 reported that perceived usefulness drives smartphone technology acceptance among young adults in Malaysia. Mobile-broadband subscriptions in Malaysia of the second quarter of 2018 reached 36.2 million, compared to just 2.6 million fixed-broadband subscriptions (IUS 2018). Smartphones remained the most popular means for users to access the internet, with nine out of ten internet users using the device online (IUS 2018).

The smartphone can be used to disseminate information on good agricultural practices, including seed quality, crop yields, weather forecasts, markets and the use of agricultural inputs such as fertilisers and pesticides, and to provide farmers with new directions and approaches to directly link and share recent advances in other consulting services (Chhachhar & Md Salleh Hassan 2012; Panda 2019; Ashraf, Shurjeel & Iqbal 2018). There is a need to formulate the right messages for farmers, address illiteracy, and empower farmers in using mobile phones (Anjum 2015). Cellular technology has entirely changed the farmers' way of sharing information and communicating with markets and towns. It helps farmers to extract relevant information for their decision-making (Ilahiane, Hall & Sherry 2012). There are many telecommunications companies in Malaysia, such as Celcom, Maxis, Digi, U-mobile, TM-Unifi, XOX and YES. Most companies provide customers with 3G and 4G technologies to access the internet through

mobile phones. Access, efficiency, and affordability of agricultural information are significant constraints in enhancing agricultural productivity among small scale farmers (Murithii 2009).

METHODOLOGY

This paper has been executed through a secondary data review—research based on data collected from a previous study. The sources of secondary data were collected based on official statistics from government agencies, such as the Malaysian Palm Oil Board (MPOB), the Department of Statistics Malaysia (DOSM) and the Malaysian Communication and Multimedia Commission (MCMC). There are technical and statistical reports such as the Internet Users Survey report and reference books. Information from government agencies found that the palm oil industry plays a vital role in contributing to the country's GDP. Apart from it, the majority of the contribution is from smallholders. Therefore, the empowerment of extension services is essential to sustain the smallholders' productivity and income. As mentioned in the literature review, the importance of extension and advisory services to smallholders improves smallholders' farm productivity and income. Many social networking sites are related to the palm oil industry from government agencies and non-government agencies by exploring websites. For example, this has provided information about social networking sites as a platform to disseminate information and interaction between smallholders. Content analysis of the data obtained based on the objectives of the study. Each data obtained is analysed textually to answer the objectives of the study. The published and unpublished reviews were narratively evaluated. The research findings provide insights into social media's patterns and benefits in extension services for researchers and practitioners.

RESULTS AND DISCUSSION

THE ROLE OF SOCIAL MEDIA APPLICATIONS IN MALAYSIA

Malaysia was ranked for mobile social media penetration in the top five globally and the highest in Southeast Asia in 2019 (Kemp 2020). As of January 2020, Malaysia had 26.69 million Internet users, 81% are social media users (Kemp 2020). From 2019 to 2020, the number of internet users in Malaysia will increase by 919 thousand (+3.6%) (Kemp 2020). From April 2019 to January 2020, the number of social media users in Malaysia has increased by 1.0 million (+4.1%) (Kemp 2020). In January 2020, there were 40.69 million mobile connections in Malaysia (Kemp 2020). From January 2019 to January 2020, the number of mobile connections in Malaysia increased by 175 thousand (+0.4%) (Kemp 2020). The number of mobile connections in Malaysia in January 2020 was equivalent to 127% of the total Malaysian population (Kemp 2020). Similarity, ride-hailing applications are also trendy in Malaysia, the world's third-highest country after Singapore and Indonesia. It accounted for 48% of internet users (Bernama 2019).

Today, social media tools have brought rapid change to organisational communication and public relations. There is a growing rate of social media usage among stakeholders (Bhattacharjee 2016). This latest online platform has changed the focus from consumer-based Internet services to a more open and collaborative mode between organisations and the public (Henderson and Bowley 2010). Social media is advantageous in connecting businesses to end-consumers directly and promptly at a low cost (Kaplan & Haenlein 2010). Apart from individual usage, social media also provides various benefits to organisations. It could influence customer perceptions and behaviour (Vallaster & von Wallpach, 2013). The greater productivity of social media motivated business leaders to encourage companies to engage in Facebook, Twitter, MySpace, and others to excel in online environments compared to other conventional communication platforms (Kaplan & Haenlein 2010). Social media, or social networking sites (SNSs) is one of Malaysia's most popular means of interactive communication (Rahman et al. 2015).

In Malaysia, social media has also taken over the Malaysian population with Facebook, Twitter, LinkedIn, YouTube and Blog. The remarkable development of social media such as SNSs in Malaysia has garnered millions of users to use those websites or applications in their daily life practice. The communication apps survey (IUS 2018) found about 27.8 million communication apps users, and 98.1% of those were holding a WhatsApp account. Moreover, (YouGov 2019) reported that WhatsApp is the most frequently used platform in Malaysia, with approximately 88% of those using the app at least once a week. It was followed by Facebook (81%), YouTube (74%), Instagram (64%), and Facebook Messenger (40%). Facebook users

in Malaysia have an average of 233 friends, which is about 80% higher than the global average (Wok & Mohamed 2017; Marlyna et al. 2019). It was supported by a (YouGov 2019) report in April 2019 that said Malaysians spent almost a quarter of their day on social media. The digital version of (Kemp 2020) reports that the Internet penetration rate in Malaysia is about 83% of Internet users spend an average of 7 hours and 57 minutes online every day. The data found that Malaysians primary motivation for social media is to stay up to date with news and current events (72% and followed by keeping in touch with friends (69%) (YouGov 2019). Other reasons for using social media are sharing photos, videos, or other content with people (51%) finding funny or engaging content (48%) and searching for new products to purchase (45%) (YouGov 2019).

A study conducted by Statista (2020) showed that Facebook is the most popular platform worldwide (*Table 2*). Simultaneously, the study conducted by Wong (2018) also stated that Facebook is the most popular user social media platform in Malaysia. According to (Thakur et al. 2018), in the Indian context, farmers preferred WhatsApp over Facebook due to its convenience in use, privacy, and lesser internet data requirements. *Table 3* describes the most popular social media platforms and apps in Malaysia. According to the report IUS (2018), it was also found that 44.5% of Internet users have accessed online government services, while 27.5% of users are looking for work. However, since 2014, the usage of online government services has hovered around 45.0%. Therefore, there is more room to provide better online government services (IUS 2018).

TABLE 2. Most famous social media platforms by total users in Malaysia and worldwide

Malaysia		World	
Platform	Number of users (million)	Platform	Number of users (billion)
Facebook	23	Facebook	2.7
YouTube	20	YouTube	2.0
Instagram	11	WhatsApp	2.0
LinkedIn	4.4	Facebook Messenger	1.30
Twitter	2.2	WeChat	1.21
Source: Wong (2018)		*Source*: Most popular social networks worldwide as of October 2020, Statista (2020)	

TABLE 3. Most famous social media platform and apps in Malaysia

Types of platform	Description
Facebook	Facebook is an online social media and social networking site. It can be accessed from internet-connected devices such as personal computers, tablets, and smartphones. It allows users to build an online profile with personal details, photos, videos and other information.
YouTube	Users can upload, display, rate, share, add playlists, report, comment on videos via YouTube.
WhatsApp Messenger (WhatsApp)	WhatsApp messenger runs on mobile devices but is accessible from desktop computers as well. It allows users to send and receive voice, text messages, images, videos, documents and user locations using the internet connection.
Instagram (IG)	The app allows users to upload photos that can be edited with filters and arranged with tags location information. Postings can be shared with pre-approved followers or public services or share them on social media like Facebook, Twitter and Tumbir.
Telegram	Telegram is an instant messaging system that focuses on privacy and multiplatform availability. Both mobile (Android, iOS, Windows Phone, Ubuntu Touch) and desktop systems have telegram application.

Source: Wikipedia (2020) accessed on 16 June 2020

TABLE 4. SNSs related to palm oil in Malaysia

Name of Agency/Group/Community/Pages/Apps	SNSs	No. Followers/ members/likes
Ministry of Plantation Industries and Commodities (MPIC) Government official- Government Organization. Public & Government Services https://www.facebook.com/MYMPIMalaysia	Facebook	24,247 likes and 25,059 followers
Malaysian Palm Oil Board (MPOB) Government Organisation https://www.facebook.com/malaysianpalmoilboard		31,412 likes, 32,852 followers
MPOCC Malaysian Palm Oil Certification Council (MPOCC) is an independent non-profit organisation established in December 2014. https://www.facebook.com/mpoccmas		9,446 likes, 9,781 followers
Persatuan Penanam Sawit Malaysia (PPSM) This group was established in February 2014, and this group aims to share knowledge and experiences in the palm oil sector within Malaysian and another neighboring region. https://www.facebook.com/groups/sawitmas		68,000 members
You Zong Nong You (Friends of Palm Oil) Establish a Chinese platform for public group interaction in the palm oil industry on 1 September 2015. https://www.facebook.com/groups/1665529423689767		15,000 members
Kementerian Perusahaan Perladangan dan Komoditi (MPIC) @mpic_my	Twitter	5,381 followers
@mpob_tweets Joined April 2016		2,964 followers
MY Palm Oil council Joined Jan 2014		6,924 followers
MPOCC Joined Jan 2017		1,498 followers
MSPO Trace It is developed by MPOCC, launched on 5 November 2019.	Apps	It is downloaded through the play store more than 1000 times.

Source: SNSs (updated as of 9 September 2020)

Table 4 shows crucial social networking sites used in agricultural extension service delivery in Malaysia. The number of followers/members of these pages, communities, and groups will increase every day. Social media use in agriculture has not been restricted to any specific age group but users belong to all age groups (Raj & Bhattacharjee 2014; Marlyna et al. 2019). Social media has provided a platform for farmers to interact (van Dijck and Poell 2013). Further, the occasional use of Facebook and lack of knowledge about agricultural extension were another reported constraint for seeking and sharing agricultural information (Thakur et al. 2018). Mohamad Nasir and Ahmad (2015) also indicate that Facebook remains a favourite platform for deliver effectively communicate environmental messages to the public because of the low to zero cost. The use of ICT to disseminate agricultural information has tremendous potential to allow smallholders to share knowledge and experience through social media, telecentres and powered communication devices (Chisita 2010). Besides, virtual networks play an increasing role, and extension services can use new ICT techniques to optimise such farmer groups' networks (Norton & Alwang 2020; Rashid & Samat 2019).

Furthermore, this emphasises the extension staff's needs to prepare on-job training and build the capacity to adopt social media applications. The highly educated extension staff could be trained on the sophisticated aspects of social media technology. The extension agencies should also endorse the adaptation and development of relevant information disseminated through these tools (Marlyna et al. 2019). Mainly, computer and information technology related training must be provided at the village level and with the long-term benefit of ensuring the technology is locally owned, thus enhancing the agricommodity extension approach. However, Internet usage is still low in rural areas due to a lack of connectivity, expertise, places, and changes in individual lifestyles (Rashid & Samat 2019; Wan Fariza Alyati Wan Zakaria & Jabal 2021). Various ICT tools and smartphone apps

are needed to help farmers with good agriculture practises and sustainable productivity. For example, the registration of farmers using the 'Mobile App', the recording of farm attributes, establishing a call centre supported by a specialist in the field, enabling the smallholder community to obtain technical support and advice was following their local conditions (Marlyna et al. 2019). Moreover, ICT ensures producers' efficient and sustainable production. Therefore, it can be concluded that the intervention of ICT could drive agricultural production and ultimately improve their living standard.

CONCLUSION

Developed countries are focusing on developing advanced agricultural technology. However, the situation is far behind in developing countries, such as insufficient infrastructure, low literacy, and solving the farmers' fundamental issues (*Wan Fariza Alyati Wan Zakaria & Jabal 2021*). Besides, there are many obstacles to transferring knowledge from developed countries to developing countries. New ICTs should be disseminated among end-users to solve the digital gap of the world to transfer information promptly to promote sustainable agricultural development. ICT is possible to strengthen the linkage between extension, research, and farmers. At the same time, the growing number of Internet users and the competitive mobile broadband market contributed by expanding mobile broadband infrastructure. Finally, it makes the service more affordable, thus accelerating digital inclusion. Better coverage and services allow the farmers to access the internet at their farm's best comfort easily. Thus, it can result that the number of farmers with Internet access growing faster at an acceptable cost.

Further research on Geographical Information System (GIS)/ Global Positioning System (GPS) includes developing GIS-based soil fertility and soil series maps, and remote sensing technologies used in decision-making for precision agricultural development. Thus, the Internet of Things (IoT) or Internet of Everything (IoE) and blockchain based smart farming applications should be promoted among smallholders to conquer the palm oil sustainability debate. Besides, due to the covid-19 pandemic, using social media to spread knowledge and services to smallholders is a new routine extension activity. A relevant and robust research development and extension service will allow oil palm smallholders to be the focal point in reforming Malaysia's palm oil industry.

ACKNOWLEDGMENT

This study was supported by the MPOB-UKM Endowment Chair Grant EP-2020-033, which has enabled this study to be conducted smoothly and successfully.

REFERENCES

Ahmed Awad Talb Altalb, Tadeusz Filipek, Piotr Skowron, John Mwangi & Piotr Skowron Ahmed Awad Talb Altalb, Tadeusz Filipek. 1998. The Role of Extension in the Transfer and Adoption of Agricultural Technologies. *Journal of International Agricultural and Extension Education* 5 (1): 63-68.

Ahmed, Yunis Ali, Mohammad Nazir Ahmad, Norasnita Ahmad & Nor Hidayati Zakaria. 2019. Social Media for Knowledge-Sharing: A Systematic Literature Review. *Telematics and Informatics* 37: 72-112.

Aker, Jenny C. 2011. Dial "A" for Agriculture: A Review of Information and Communication Technologies for Agricultural Extension in Developing Countries-Working Paper 269. *Agricultural Economics* 42(6): 631- 647.

Anderson, J.R. 2007. Agricultural advisory services. Background paper for World Development Report 2008, Agriculture for Development. Washington, D.C.: World Bank.

Anderson, Jock R. & Gershon Feder. 2004. Agricultural Extension: Good Intentions and Hard Realities. *World Bank Research Observer* 19 (1): 41-60.

Anjum, Rafiq. 2015. *Design of Mobile Phone Services to Support Farmers in Developing Countries*. Master's Thesis. University Of Eastern Finland.

Ashraf, Ejaz, Hafiz Khurram Shurjeel & Mujahid Iqbal. 2018. Creating Awareness among Farmers for the Use of Mobile Phone Cellular Technology for Dissemination of Information Regarding Aphid (Macrosiphum Miscanthi, Hemiptera, Aphididae) Attack on Wheat Crop. *Sarhad Journal of Agriculture* 34 (4): 724-28.

Atikah, N., Rahman, A., & Hassan, H. 2015. Social Media Research Trends In Malaysia: An Analysis of Three Major Communication Journals In Malaysia. In: *Second International Conference on Media, Communication and Culture (ICMCC 2015)*, 30 Nov. - 2 Dec. 2015, Vistana Hotel, Penang.

Awang, Abd Hair, Khairuman Hashim, Zaimah Ramli, Novel Lyndon, Izzurazlia Ibrahim, Tan Say Peng, Mohd Arfan Johari, Nur Hana Basaruddin, Mohd Haidar, Abdul Hamid & Ishak Yusof. 2016. Pemindahan Teknologi dan Produktiviti Pemindahan Teknologi dan Produktiviti Pekebun Kecil Persendirian Sawit Di Teluk Intan, Perak.
e-Bangi Journal of Social Sciences and Humanities 1 (1): 078 – 087.

Banerjee, Anwesha. 2011. The Ict in Agricutture : Bridging Bharat With India. *Global Media Journal - Indian Edition* 2 (2): 1-16.

Bernama. 2019. *Malaysia Ranks Top 5 Globally in Mobile Social Media Penetration Highest in Region*. NST Online. 2019. https://www.nst.com.my/lifestyle/bots/2019/01/456119/malaysia-ranks-top-5-globally-mobile-social-media-penetration-highest. (accessed on: 8 July 2020).

Bhattacharjee, Suchiradipta. 2016. Social Media: Shaping the Future of Agricultural Extension and Advisory Services Analyzing Policy Ecosystem for Climate Smart Agricultural Systems in India View Project GFRAS Interest Group on ICT4RAS Discussion Paper View Project. 9-32.

Binswanger-mkhize, Hans, Natasha Mukherjee & Kirit Parikh. 2012. India 2039 –Transforming Agriculture: Productivity, Markets, and Institutions. *Global Journal of Emerging Market Economies*, 4(2):197-226

Böhmer, Matthias & Antonio Krüger. 2013. A Study on Icon Arrangement by Smartphone Users. Conference on Human Factors in Computing Systems - Proceedings, November 2015: 2137-46.

Chhachhar, Abdul Razaque & Md Salleh Hassan. 2012. The Use of Mobile Phone Among Farmers for Agriculture Development. *International Journal of Scientific Research* 2 (6): 95–98.

Chisita, Collence T. 2010. Meeting: Session 85-Agricultural Libraries. *World Library and Information Congress*, 1–14.

Davis, Kristin. 2020. Extension and Advisory Services Role in the COVID-19 Crisis. Agrilinks. Agrilinks. May 7, 2020. https://www.agrilinks.org/post/extension-and-advisory-services-role-covid-19-crisis. (accessed on: 11 January 2021).

Davis, Kristin & Willem Heemskerk. 2012. Investment in Extension and Advisory Services as Part of Agricultural Innovation Systems Overview. *In Agricultural Innovation Systems*: 179-259.

Dijck, José van& Thomas Poell. 2013. Understanding Social Media Logic. *Media and Communication* 1 (1): 2-14.

FAO. 2010. Tracking Initiatives in Communication for Development in the Near East. 7-16.

Feder, G., R. Murgai & J. Quizon. 2008. Investing in Farmers-'The Impacts of Farmer Field Schools in Relation to Integrated Pest Management'-A Comment. *World Development* 36 (10): 2103-6.

Feder, Gershon, Richard E Just & David Zilberman. 1984. Adoption Of Agricultural Innovations In Developing Countries: A Survey. *Economic Development and Cultural Change* 33(2): 255-298.

Fu, Xiaolan & Shaheen Akter. 2016. The Impact of Mobile Phone Technology on Agricultural Extension Services Delivery: Evidence from India. *Journal of Development Studies* 52 (11): 1561-76.

Henderson, Alison & Rachel Bowley. 2010. Authentic Dialogue? The Role of 'Friendship' in a Social Media Recruitment Campaign. *Journal of Communication Management* 14 (3): 237-57.

Hu, Ruifa, Yaqing Cai, Kevin Z. Chen & Jikun Huang. 2012. Effects of Inclusive Public Agricultural Extension Service: Results from a Policy Reform Experiment in Western China. *China Economic Review* 23 (4): 962-74.

Ibrahim, Izzurazlia, Abd Hair Awang, Khairuman Hashim, Zaimah Ramli, Novel Lyndon, Fatin Umaira Muhamad Azian, Mohd Arfan Johari, et al. 2018. Independent Oil Palm Smallholder Participation and Technology Transfer. In *Selected Topics on Archaeology, History and Culture in the Malay World*, edited by Mohd Rohaizat Abdul Wahab, Ros Mahwati Ahmad Zakaria, Muhlis Hadrawi, and Zuliskandar Ramli, 217-24. Singapore: Springer.

IFPRI. 2020. Topic: Agriculture Extension. International Food Policy Research Institute. 2020. https://www.ifpri.org/topic/agricultural-extension. (accessed on: 11 January 2021).

Ilahiane, Hsain, Lafferty Hall & John W Sherry. 2012. The Problematics of the 'Bottom of the Pyramid' Approach to International Development: The Case of Micro-Entrepreneurs' Use of Mobile Phones in Morocco. *Information Technologies & International Development* 8 (1): 13-26.

IUS 2018. Internet Users Survey 2018. Malaysian Communications and Multimedia Commission (MCMC).

Jones, G.E. & Garforth, C. 1997. The history, development, and future of agricultural extension in Swanson, B. *Improving Agricultural Extension: A Reference Manual* (3rd Edition). The Food and Agriculture Organization of the United Nations.

Kaplan, Andreas M. & Michael Haenlein. 2010. Users of the World, Unite! The Challenges and Opportunities of Social Media. Business Horizons 53 (1): 59–68.

Kellogg, Kristi. 2020. The 7 Biggest Social Media Sites in 2020. Search Engine Journal. 2020. https://www.searchenginejournal.com/social-media/biggest-social-media-sites/. (accessed on: 11 January 2021).

Kemp, Simon. 2020. Digital 2020: Malaysia. DataReportal – Global Digital Insights. 2020. https://datareportal.com/reports/digital-2020-malaysia. (accessed on: 11 January 2021).

Kipkurgat, Thomas, Michael Onyiego & Silahs Chemwaina. 2016. Impact Of Social Media On Agricultural Extension In Kenya: A Case Of Kesses District. International *Journal of Agricultural Extension and Rural Development Studies* 3 (1): 30-36.

Lazim, Halim Mad & Sasitharan. 2014. The Smartphone Technology Acceptance Among Malaysian Young Adulats. In ICTOM 04 – The 4th International Conference on Technology and Operations Management, 562-70.

Marlyna Maros, Azianura Hani Shaari & Er Ah Choy. 2019. Sikap Belia dalam Industri Sawit di Malaysia: Satu Kajian Keperluan. *Akademika* 89 (1): 175-189.

Mohamad Nasir, Nur Nasliza Arina & Jamilah Ahmad. 2015. Facebook Dan Media Massa: Keberkesanan Dalam Menyampaikan Mesej Alam Sekitar Kepada Masyarakat. *Akademika* 85 (1): 33-46.

Munyua, Hilda, Edith Adera & Mike Jensen. 2009. Emerging ICTs and Their Potential in Revitalizing Small Scale Agriculture in Africa. *Agricultural Information Worldwide* 2 (1): 3-9.

Murithii 2009. Information technology for agriculture and rural development in S.Africa: Experiences from Kenya. A Paper presented at the International research on Food Security, Natural Resources Management and Rural development, Tropetag, Univ. Hamburg.

Norton, George W. & Jeffrey Alwang. 2020. Changes in Agricultural Extension and Implications for Farmer Adoption of New Practices. *Applied Economic Perspectives and Policy* 42 (1): 8-20.

Ohiagu, O. P. 2011. Internet_as_Medium_of_the_Mass_ Media. Kiabara. *Journal of Humanities* 16 (2): 225-232.

Panda, Subhrajyoti. 2019. Use of Mobile Phone by the Farmers for Agriculture and Allied Activities. *International Journal of Inclusive Development* 5 (2): 49-51

Pandey, Richa & Pushpa Kumari. 2018. Use of Information Technology among Farmers. *International Journal of Applied Home Science* 5 (3): 555-60.

Parveez, Gulam Kadir Ahmad, Elina Hishamuddin, Soh Kheng Loh, Meilina Ong-Abdullah, Kamalrudin Mohamed Salleh, Mohd Noor Izuddin Zanal Bidin, Shamala Sundram, ZafarizalAldrin Azizul Hasan & Zainab Idris. 2020. Oil Palm Economic Performance In Malaysia And R&D Progress In 2019. *Journal of Oil Palm Research* 32 (2): 159-90.

Peng, Tan Say, Khairuman Hashim, Nur Hanani Mansor, Parthiban Kannan, Amran Ariffin, Mohamad Arfan Johari, Khairul Abidin, Nursuhana Dahari, Hasmiza Desa & Khairul Anwar Isnin. 2019. Assessment on Knowledge on Fertiliser Management among Independent Smallholders in Malaysia. *Oil Palm Industry Economic Journal*. vol. 19: 1-16.

Post, Borneo. 2018. NGO: Europe's Palm Oil Ban Puts M'sia's Smallholders at Risk. Borneo Post Online. 2018. https://www.theborneopost.com/2018/12/25/ngo-europes-palm-oil-ban-puts-msias-smallholders-at-risk/. (accessed on: 1 July 2020).

Rahman, Nur Atikah A & Md. Salleh Hj. Hassan. 2015. Theoretical Analysis of Social Media Research in Malaysian Journals and Doctoral Dissertations from 2004-2015. *Human Communication* 1 (2): 90-112.

Raj, S. & Bhattacharjee, S. 2014. Social Media: New Generation Tools for Agricultural Extension. *Technical Report* 1 (12): 1-6.

Rashid Siti Masayu R. A. & Samat Narimah. 2019. Peranan Dan Perlaksanaan ICT Dalam Memperkasakan Usahawan Wanita Luar Bandar Di Malaysia. *Akademika* 89 (3): 75-88.

Rogers, Everett M., Arvind Singhal & Margaret M. Quinlan. 2019. Diffusion of Innovations. An Integrated Approach to Communication Theory and Research, Third Edition, no. March (January): 415-33.

Statista. 2020. Most Used Social Media 2020. Statista. 2020. https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/. (accessed on: 5 December 2020).

Šūmane, Sandra, Ilona Kunda, Karlheinz Knickel, Agnes Strauss, Talis Tisenkopfs, Ignacio des Ios Rios, Maria Rivera, Tzruya Chebach & Amit Ashkenazy. 2018. Local and Farmers' Knowledge Matters! How Integrating Informal and Formal Knowledge Enhances Sustainable and Resilient Agriculture. *Journal of Rural Studies* 59 (12): 232-241.

Swanson, Burton E. & Kristin Davis. 2014. Status of Agricultural Extension and Rural Advisory Services Worldwide Summary Report. Global Forum for Rural Advisory Services (GFRAS) The US Government's Global Hunger & Food Security Initiative.

Tambo, Justice A., Caroline Aliamo, Tamsin Davis, Idah Mugambi, Dannie Romney, David O. Onyango, Monica Kansiime, Christine Alokit & Stephen T. Byantwale. 2019. The Impact of ICT-Enabled Extension Campaign on Farmers' Knowledge and Management of Fall Armyworm in Uganda. *PLoS ONE* 14 (8), 2-3.

Tang, Kuok Ho Daniel & Hamad M.S. Al Qahtani. 2020. Sustainability of Oil Palm Plantations in Malaysia. *Environment, Development and Sustainability* 22 (6): 4999-5023.

Tantisantisom, Khumphicha. 2011. *Information Dissemination for Farming Communities in Thailand*. Doctoral thesis, Edith Cowan University. 51-78.

Tata, Joyous S. & Paul E. McNamara. 2016. Social Factors That Influence Use of ICT in Agricultural Extension in Southern Africa. Agriculture (Switzerland) 6 (2): 1-10.

Thakur, Devesh, Mahesh Chander, Devesh Thakur & Principal Scientist. 2018. Use of Social Media in Agricultural Extention: Some Evidences from India. International *Journal of Science, Environment and Technology* 7 (4): 1334- 1346.

Tian, Lei, Junqi Shi & Zizhen Yang. 2009. Why Does Half the World's Population Have a Mobile Phone? An Examination of Consumers' Attitudes toward Mobile Phones. *Cyberpsychology and Behavior* 12 (5): 513-16.

University, Tufts. 2021. Social Media Overview. Tufts University Relations. 2021. https://communications.tufts.edu/marketing-and-branding/social-media-overview/. (accessed on: 16 June 2020).

Vallaster, Christine & Sylvia von Wallpach. 2013. An Online Discursive Inquiry into the Social Dynamics of Multi-Stakeholder Brand Meaning Co-Creation. *Journal of Business Research* 66 (9): 1505-15.

Wan Fariza Alyati Wan Zakaria & Jabal M. B. 2021. The Theory of Post-Industrial Society. *Akademika* 91 (1): 139-149.

Waithaka, M. 2001. Agricultural Extension and Rural Development: Breaking out of Traditions. *Agricultural Systems* 1 (68): 175-176.

Wikipedia. 2020. Social Media. Wikipedia. 2020. https://en.wikipedia.org/w/index.php?title=Social_media&oldid=1004374389. (accessed on: 16 June 2020).

Wok, Saodah & Shafizan Mohamed. 2017. Internet and Social Media in Malaysia: Development, Challenges and Potentials. In The Evolution of Media Communication. *InTech Open Science* 4 (5):.49-68.

Wong, C K. 2018. Top 5 Social Media Platforms by Total Users in Malaysia. Silvermouse. 2018. https://blog.silvermouse.com.my/2018/09/top-5-social-media-platforms-malaysia.html. (accessed on: 16 June 2020).

World Bank. 2011. ICT in Agriculture: Connecting Smallholders to Knowledge, Networks, and Institutions; World Bank: Washington, DC, USA.

YouGov. 2019. Malaysians Spend Almost a Quarter of Their Day on Social Media. YouGov: What the World Thinks. 2019. file://my.yougov.com/en-my/news/2019/04/30/malaysians-spend-almost-quarter-their-day-social-m/. (accessed on: 16 June 2020).

Tan Say Peng
Lembaga Minyak Sawit Malaysia (MPOB)
6, Persiaran Institusi, Bandar Baru Bangi,
43000 Kajang, Selangor
Malaysia.
Email: saypeng@mpob.gov.my

Prof Madya Dr Novel Anak Lyndon (corresponding author)
Pusat Kajian Pembangunan, Sosial & Persekitaran (SEEDS)
Fakulti Sains Sosial dan Kemanusiaan
Universiti Kebangsaan Malaysia (UKM)
43600 UKM, Bangi Selangor
Malaysia.
Email: novel@ukm.edu.my

Khairuman Hashim
Lembaga Minyak Sawit Malaysia (MPOB)
6, Persiaran Institusi, Bandar Baru Bangi,
43000 Kajang, Selangor
Malaysia.
Email: khairuma@mpob.gov.my

Zaki Aman
Lembaga Minyak Sawit Malaysia (MPOB)
6, Persiaran Institusi, Bandar Baru Bangi,
43000 Kajang, Selangor
Malaysia.
Email: zaki@mpob.gov.my

Received: 26 January 2021
Accepted:1 September 2021