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SYNERGISING RURAL CHANGE BASED ON MODERN RURAL APPROACH: FORMULATION OF A MODERN MALAYSIAN RURAL DEVELOPMENT FRAMEWORK

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Abstract

The Malaysian government aims to transform rural areas into economic focal points, improve rural livelihoods, living environment and narrow the life quality gaps between those living in urban and rural areas. This aspiration can be seen through a translation in many national development policies, particularly in Dasar Perancangan Fizikal Desa Negara (the DPF Desa Negara 2030), Dasar Pembangunan Luar Bandar (the DPLB 2030) and the most current is Wawasan Kemakmuran Bersama (the WKB 2030). Inspired by the government directive-aspirations and the emergence of new technologies in rural practices, nationally and globally, this paper discusses the formulation of a framework for rural development in Malaysia based on the modern rural approach; that is a solution to synergise rural change and social well-being of the community. The process undertakes to formulate the framework comprised into two main stages, namely focused literature study and review of the existing policies and strategies to identify the key assessment elements and criteria for modern rural development, and conduct an expert view survey to validate the developed elements and criteria and then formulate a modern Malaysian rural development framework (FMRD). The FMRD has finally been formulated by incorporating all the important elements and criteria of the DPF Desa Negara 2030 and the DPLB 2030 as well as integrating them with the smart technologies and ICT practices to reflect a holistic approach for rural problems. This paper concludes that the FMRD is a timely approach for the rural assessment to maximise the rural performance towards the future niches in Malaysia - rural sustainability-resilient-and-smart.

Keywords: *modern rural; sustainability-resilient-and-smart; smart technology practices; rural infrastructure; internet of things; IR4.0*

1.0 INTRODUCTION

In Malaysia, more than 25,000 villages contribute to as much as 26% or 7.8 million of the Malaysian total population (Dasar Pembangunan Luar Bandar, 2017). Moreover, the rural population size is expected to slowly decrease through the years and will reach approximately 7 million in the year 2030. These circumstances are mainly due to the increase of out-migration from rural to urban as a result of limited economic boosters, lack of investments and technology practices, consequently, contributing to low productivity, elderly human resources, low wage, and so forth.

In responding to the alarming situations, various development policies and strategies were introduced to reduce the urban and rural development gaps and to improve the social well-being of the rural community. One of them is the National Key Result Areas (NKRA) under the Government Transformation Programme in 2010, aiming to transform rural areas into economic focal points and improve rural livelihood through services and infrastructure development projects. Furthermore, the most important ongoing policies are 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 (launched in 2018) and the most recent is the Wawasan Kemakmuran Bersama (WKB) 2030. Those are the most important development tools to synergise rural change and social well-being aligned with the Sustainable Development Goals (SDGs). To this extent, rural assets and resources (agricultural, entrepreneurship, business, tourism) should be further explored and more importantly, to prevent any obstacles or difficulties faced by rural communities in fulfilling their needs in the global urbanisation challenges.

Inspired by this, the current research aims to formulate a framework for modern rural development in Malaysia based on a new approach focusing on rural infrastructure planning and technology practices.

2.0 LITERATURE REVIEW

2.1 Liveable, Resilient and Smart as the Key Concept Principles for Modern Rural Approach

The concept of the modern village development concerning development has been broadened since the early industrial revolution era (Levin & Feniger, 2018). It aims to transform the village into a modernised area impacting rural economic, social, environment and technology, and enhancement to rural communities' livelihoods. In that case, the term modernisation can be broadened to reflect the varied ways in which it has been practised resulting in diverse visions of modernisation. As suggested in the literature, the development criteria of a modern rural village include strengthening local business, education, health and welfare, technology engagement, and food security in which to consent as compulsory elements in the modern rural approach (Levin & Feniger, 2018; Rahmawati et al. 2017). As such, this research would formulate a modern framework of rural development based on the existing Malaysian National Policies framework, specifically the DPF Desa Negara 2030, focusing on liveable and resilient rural, and DPLB 2030, focusing on sustainable rural, and embedded with the best practices of smart village models internationally.

2.2 DPF Desa Negara 2030

The DPF Desa Negara 2030 was formulated as an essential blueprint to drive development actions towards rural community's prosperity with the vision **"**Prosperous Rural, Prosperous Nation". It is oriented towards its objective "liveable and resilient rural". Aligned with the concepts of Sustainable Development Goals (SDGs) and 11th Malaysia Plan 2016-2020, the DPF Desa Negara 2030 was constructed by considering the vital elements in developments, which are physical, economics, social and environment to overcome the alarming issues of development imbalance between the urban and rural areas, and urbanisation.

Pertinent to the focus of the study, which is to identify rural infrastructures, facilities or any other rural physical attributes for modern rural development, four main thrusts were evaluated; Thrust 2, Thrust 3, Thrust 4 and Thrust 5. Thrust 1 is deemed unsuitable as it focuses on the sustainable plan and strategy management of the rural environment that has less emphasis on the physical or infrastructure elements. Regardless of that, the provision of environment-related-infrastructure is covered under Thrust 3 (Reinforcing rural liveability). Thrust 2 mainly focuses on the strategy in reinforcing urban-rural relationship to improve rural quality of living and living environment (such as more progressive, comfortable, inclusive and assuring social welfare, liveability and prosperity) through complete infrastructures, facilities and services especially at town and rural growth centre. While Thrust 3 is the strategy to reinforce the liveability of the rural community by focusing on the basic facilities within the village besides exploring and promoting rural assets such as agriculture, traditional houses, the aesthetics of the rural environment that might be unavailable or scarce especially in the city. Whereas Thrust 4 puts focus on the strategy in empowering rural economy through the exploration of diverse rural sources and integrating best practices to improve productivity, marketing technique and maximum revenue. Finally, Thrust 5 puts focus on implementable rural

management, as an instrument to the implementation of a targeted and sustainable rural development plan - as the major factor in the effectiveness of a rural development implementation is at its very implementation.

Accordingly, about 8 criteria groups were formed to represent 101 criteria derived from Thrust 2 to Thrust 5 of DPF Desa Negara 2030. Those criteria are the rural infrastructures, facilities and rural economy and services as well as distinctive rural governance that are required for synergising rural change and community social well-being. That is the future rural face of modernisation, welfare and prosperity. Those criteria have gone through a validation process based on expert view survey and have been finalised in Appendix 1.

2.3 DPLB 2030

DPLB puts emphasis on the vision, “A Prosperous, Inclusive, Sustainable and Holistic Rural '' as the main agenda in the process of developing Malaysian rural by the year of 2030. This vision highlights the assurance of access for infrastructure and social facilities which are equitable to those in the city to the rural community. Most importantly, rural areas are targeted to offer jobs and business opportunities aimed at increasing the income of the rural population. This target is aligned with the DPF Desa Negara 2030. The key action areas extracted from the DPLB 2030 were analysed with respect to the research focus, and this research summarised the 4 key important working actions to be materialised in the modern rural development framework. They are outlined as follows:

- To ensure the rural communities have good access to infrastructures and public amenities similar to urban areas. This is parallel to the DPF Desa Negara 2030.
- To attract profound urban residents and investors to live in rural areas to increase the number of productive populations and enhance rural economic capability.
- To enhance the rural capability as an important domestic and international tourism choice to experience and enjoy natural beauty, cultural heritage and rural life.
- More importantly, the rural area is aimed at creating new jobs and business opportunities, thus, shall increase the income of the rural population and living standard.

Those identified working actions will be accounted accordingly in the formulation of the modern rural development framework.

2.4 Smart Rural Concept

It is not an easy task to identify the appropriate criteria/technology practices complementary to rural development execution in Malaysia, due to many obstacles relating to mindset, capability, skills, preparedness, and so forth. Having said that, a benchmarking and positioning to the current best practices of international experiences is most important. Therefore, this research has selected various projects/studies to extract the key assessment criteria for modern rural development in Malaysia (Somwanshi et al. 2016; Kaur, 2016; Smart Village, 2017; Kamal et al. 2016; Kumar et al. 2017; Ramachandra et al. 2015).

Literally, the smart villages are rural areas and communities which were built on their existing strengths and assets as well as new opportunities to develop an added value, where traditional and new networks are enhanced by means of digital communications technologies, innovations and the better use of knowledge for the benefit of inhabitants. Also, smart villages are about people. They are about rural communities taking the initiatives to find practical solutions – both to the severe challenges they face and, importantly, to exciting new opportunities which are transforming rural areas.

A model of smart villages often uses the power of digital technologies and thinking beyond the village itself. The basic "smartness" components include access to high-quality education, health care, information and communication technology, finance, clean water and sanitation, and enhanced livelihoods, including villagers' own entrepreneurial activities with value added. It is also building new forms of cooperation and alliances: between farmers and other rural actors; between stakeholders; the government and private sectors and civil society; from the bottom‐up and enhanced with the top‐down inputs (European Network for Rural Development

[ENRD], 2018). Moreover, currently, IR 4.0 has become a new trend or trademark in all things, particularly the global development paradigms (Lom, Pribyl and Svitek, 2016), that is a development aligning to technology-driven progress, distinctive and completeness.

By having this general understanding, about 5 criteria groups which in turn consist of 35 criteria have been identified for the key assessment criteria as a catalyst for synergising rural change in Malaysia; that is, by collaborating all potential criteria seamlessly to maximise the rural potential that benefits the rural area and the community as a whole. From those criteria, there are some criteria of the technology practices which are very new in the rural Malaysia context such as smart health facilities, FIS, drone technology, and others which have been finalised in Appendix 1.

Appendix 1: Finalised criteria by their dimensions and criteria groups

Criteria Groups		Criteria	
Dimension 1: Rural Economic Boosters & Catalyst Infrastructures			
1	Economic and Rural Services Centre (Town)		**Economic Development**
		1	Mini market
		2	Retail: food and beverage
		3	Retail: home appliances
		4	Retail: vehicle equipments
		5	Retail: agricultural equipments
		6	Souvenir Shop
		7	Market / Stall / Bazaar
		8	Farmer's Market / Night Market / Day Market
		9	Restaurant
		10	Food Court
		11	Small-medium Business
		12	Agricultural product collection centre
		13	Petrol station
		14	Insurance company
		15	Hotel / Boarding House / Guest House
			Infrastructure Facilities
		16	Road network
		17	Power and water supply
		18	Telecommunication and ICT services
		19	Bus Station / Terminal
		20	Bus stop
		21	Railway station
		22	Ferry / Boat Terminal
			Service Centre
		23	Secondary school
		24	Primary school
		25	Kindergarten
		26	Mosque
		27	*Surau*
		28	Church
		29	Hindu temple
		30	Buddhist temple
		31	Cemetery
		32	Health clinic
		33	Rural clinic
		34	Police station
		35	Fire station
		36	Multipurpose hall
		37	Public hall
		38	Community working hall (*Balai raya*)
		39	Rural library
		40	Local park
		41	Neighbourhood park

		42	Playground
		43	Bank
		44	Registered bank agent
		45	Mini Rural Trade Centre (RTC)
			Human Development
		46	Local Centre for Business and Consultation Services
		47	Entrepreneurship skills training centre
		48	Community Rehabilitation Programme (CRP)
2	Rural Growth Centre (RGC)		**Economic Development**
		1	Agricultural product collection centre
		2	Small scale retail
		3	Shop that supplies of modern agriculture equipment and technology (including technical services)*
		4	Workshop that provides services for maintenance/ repair the agricultural equipment*
		5	Hardware shop*
			Infrastructure Facilities
		6	Road network
		7	Power and water supply
		8	Telecommunication, high-speed broadband and other ICT services
		9	Public transport terminal
			Service Centre
		10	Community and recreational facilities
		11	Mobile Community Transformation Centre (CTC)
		12	Registered bank agent
			Human Development
		13	Community Rehabilitation Programme (CRP)
		14	Elderly activity centre
		15	Youth & innovation centre*
3	Rural economic cluster (agricultural, entrepreneurial, tourism)	1	Tourist information centre
		2	Homestay operated by the community through MPKK
		3	Cheap accommodation/ budget motel*
		4	Traditional and casual food premise concept
		5	Permanent Food Production Farm (TKPM)
		6	Rural trade and retail
		7	Broadband facilities for retailer and purchaser
	Sub-Total	**70**	
Dimension 2: Rural Characters & Social Well-Being Infrastructures			
1	Rural spatial characters and heritage	1	Rural boundary and mapping rural resources
		2	Rural landmark (gateway, statue and welcoming signage)
		3	Excellent rural asset development award
		4	Agricultural areas as buffer zone
		5	New development of low-density housing (detached) suits with rural characters and B40

		6	Adaptive reuse or restoration of old house
		7	Preservation of traditional Malay house (or maintain the traditional archi-style
		8	Individual registration as National Heritage Living Person (WAKOH)
2	Transportation networks of rural-town-city, and rural accessibility	1	Bus stop for stage bus (500m distance from village)
		2	Shuttle train station
		3	Water transport jetty
		4	Rural paratransit stop (mini bus/van)
		5	MyCar, Grab and any other e-hailing service providers*
		6	Paved main entrance/access
		7	Paved rural internal road
3	Efficient infrastructure	1	Continuous and adequate water supply
		2	Extensive power supply
		3	1 Malaysia Internet Centre (PI1M)
		4	High-speed broadband
		5	Fibre optic (fixed bandwidth) coverage
		6	Cellular/ broadband coverage
		7	Sanitary landfill
		8	Recycling centre operated either by government-driven or partnership with the local community
		9	Septic tank system
4	Internal village amenities	1	Mobile facilities (clinic and library)
		2	Community hall / rural community centre
		3	*Surau*
		5	Football field / recreation / sports
		6	Healthcare centre (elderly, disabled people and neglected mother)
		7	Temporary shelter/ transit service for disaster (dedicated command centre in separation with school)
5	Rural governance (MPKK) and database	1	MPKK working room
		2	Rural community Co-operative centre
		3	Rural village database managed by a dedicated or a paid staff
	Sub-Total	**34**	
Dimension 3: Smart & Green Technology Practices			
1	Rural agricultural, infrastructures, technologies and innovations	1	Tractor
		2	Plough
		3	Harvesting machine
		4	Micro-watershed management
		5	Farmers Information System (FIS) and drone technology
		6	Drone or UAV technology (crops monitoring and pest control)
		7	Smart database for agricultural through sensors and satellite data
		8	Smart weather and irrigation system
		9	Vertical farming
		10	Vinyl green house agriculture
		11	Smart dairy through smart devices (livestock)
		12	Production of a high-demand

			agricultural products (Kenaf, vanilla, basmathi rice, *musang king*, stingless bee/ *lebah kelulut*, *burung walit*)
2	Rural entrepreneurial technologies and innovations	1	Agro-industry basic facilities (i.e. incubator centre for up to district scale)
		2	Community biogas plant for entrepreneurship activities
		3	Market analysis tools/ software
		4	Village community radio
		5	Telecommunication and video conferencing
		6	ICT related materials & outsourcing training
		7	Mentor-mentee training programme or rural icon in business*
3	Rural marketing and e-commerce	1	Fresh fruit stall (GBBS)
		2	Agrobazaar
		3	KShoppe
		4	Training centre and e-commerce services (equipped with high-speed broadband)
4	Village smart and green technology practices	1	Rainwater harvesting
		2	Renewable energy (through solar rooftop PV, solar microgrid, micro-hydroelectric, solar farming)
		3	Generate energy through biogas digestion
		4	Solar cookers
		5	LEDs
		6	Low-energy motors
		7	Flood risk alarming through smart phone
		8	Biochar for transforming garden waste into organic fertilisers – waste-to-wealth*
5	Community-IoT-based smart technology practices	1	Smart healthcare facilities/ healthcare mobile apps
		2	Waste monitoring and management system through wireless sensors monitor
		3	Smart education (through videos, smart classroom, fun-toy library)
		4	CCTV cameras/ Smart surveillance system
		5	Goods and services delivery system via mobile apps*
	Sub-Total	**36**	
	Total	**140**	

Note: *Additional new criteria suggested by the experts

3.0 RESEARCH METHODOLOGY

3.1 Process of Designing a Modern Rural Development Framework

This research adopts a mixed method of research. It involves literature studies, content analysis, and expert opinion surveys. By using the content analysis method (see Krippendorff, 2004), the study reviews the relevant content, classify and tabulate the key assessment criteria (here also refers to the proposed infrastructures, public amenities, and others that bring benefits to rural communities) in the DPF Desa Negara. As the divergence pathways of rural development towards sustainable, resilient, liveable (the DPF Desa Negara, 2017; DPLB, 2018) as well as technology-driven rural productivity (Horlings & Marsden, 2014), the process is designed as shown in Figure 1. This research incorporates two main rural development concepts namely the smart village and the liveable and resilient rural (from the DPF Desa Negara 2030) – a translation of rural sustainable development. Without exception, the key important inputs from the DPLB are also included in the framework to ensure the developed framework is parallel to the government's aspirations.

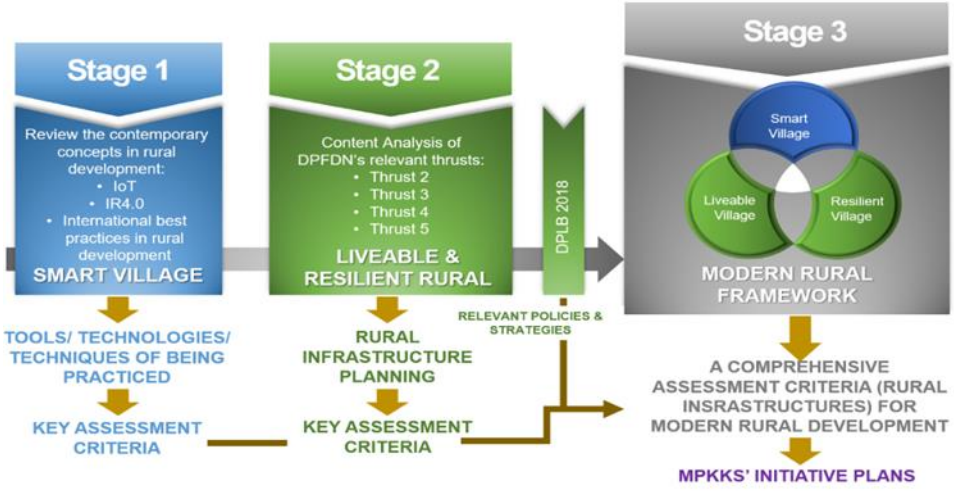

Figure 1: Conceptual process of designing a modern rural development framework

According to Figure 1, this research is specifically designed to look at rural infrastructures and the best technology practices in today's worldwide rural development. As such, the key assessment criteria (including dimensions, criteria groups, and criteria) identified from both concepts/approaches of the smart village and sustainable rural (from the DPF Desa Negara 2030 and DPLB 2030) are only relevant to that and thus would be useful and practical to be enforced by rural actors such as MPKK and any funder agencies.

3.2 Expert Opinion Survey

The research applies a single-round expert view survey to validate and assess the importance/relevance of dimension, group criteria and criteria considered in the study to reflect modern rural development outcomes. The designed assessment forms also encourage the experts to suggest additional criteria that they feel are relevant but not included in the list. They can also make recommendations to delete/combine/rephrase any dimensions, criteria groups, and criteria that they believe would improve the understanding and quality of the overall assessment for modern rural development.

Selection of experts were based on the involvement in the rural development projects and the formulation of rural development policies as well as participation in smart and green technology practices. The survey was administered by using docs.google.com which had been

sent to respective experts either through email or WhatsApp. Eight experts were selected to participate in the survey consisting of the representative of academicians, implementers, practitioners and international experts. Within 2 weeks of the given time, only 5 out of 8 experts undertook the survey and provided their feedback accordingly.

4.0 RESULTS AND DISCUSSION

By having the identified key assessment criteria, this research, therefore, has proposed a framework of modern rural development (FMRD) as a new approach for synergising rural change (Figure 2). The proposed framework relies on the adequacy of rural infrastructures, facilities, services and technology practices, particularly in agricultural, entrepreneurship and tourism developments. Empowered by incorporating the best practices or ideas of a smart village approach into the existing Malaysian rural development approach of liveable and resilient which is embedded in the DPF Desa Negara 2030 and the DPLB 2030, it would be a booster for synergising and rejuvenating rural areas and as a 'missing link' approach to the implementation of the existing policies and strategies, particularly the DPF Desa Negara 2030 and the DPLB 2030.

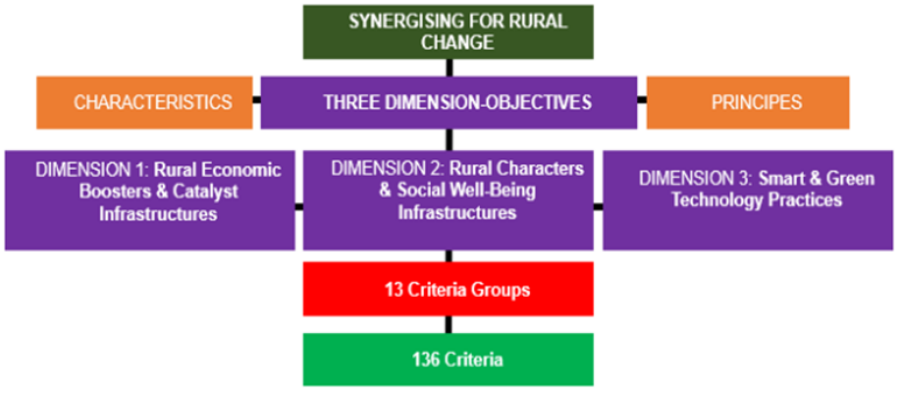

Figure 2: A framework of modern rural development for synergising rural change

The FMRD is formulated as an objective mechanism of model assessment - a translation of all the key criteria required in modern rural development. There are three dimension-objective measures constructed in the framework, namely: (1) Rural economic boosters and catalyst infrastructures, (2) Rural characters and social well-being infrastructures, and (3) Smart and green technology practices.

This section discusses the analysis of the results or information obtained from a single-round of the expert view survey. The analysis focuses on (1) to rank the importance level of dimensions and criteria groups by calculating the mean values – where lower value is considered the most priority and so on, and (2) to identify the relevant criteria to be used for further assessment of modern rural development index. Only criteria that obtain 2 out of 5 values were selected. Also, there is a situation where the experts suggested to add or rephrase or remove the criteria.

4.1 Refining and ranking of dimensions and criteria groups by priority levels

Looking at each of the three dimensions, the results show that the dimension of rural economic boosters and catalyst infrastructures obtained the lowest value, followed by rural characters and social well-being infrastructures and smart and green technology practices,

thus, they have been ranked to 1, 2 and 3, respectively (Table 1). It means that each dimension has a difference in relative importance from one to another.

Table 1: Mean value for each dimension according to the judgement of priority level from experts

Dimensions	Priority Level					Mean Value	Rank
	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5		
Rural Economic Boosters & Catalyst Infrastructures	2	1	2	1	1	**1.4**	**1**
Rural Characters & Social Well-Being Infrastructures	1	3	1	2	3	**2.0**	**2**
Smart & Green Technology Practices	3	2	3	3	2	**2.6**	**3**

Moreover, the results of the relative importance level of each criterion group within its dimension are shown in Table 2.

Table 2: Mean value for each criterion group according to the judgement of priority level from experts

Dimensions	Criteria Groups	Priority Level					Mean Value	Rank
		Expert 1	Expert 2	Expert 3	Expert 4	Expert 5		
Rural Economic Boosters & Catalyst Infrastructures	Economic and Rural Services Centre (Town)	3	1	1	1	2	**1.6**	**1**
	Rural Growth Centre (RGC)	2	2	3	3	1	**2.2**	**2**
	Rural economic cluster (agricultural, entrepreneurial, tourism)	1	3	2	2	3	**2.2**	**2**
Rural Characters & Social Well-Being Infrastructures	Efficient infrastructure	3	2	1	3	1	**2.0**	**1**
	Transportation networks of rural-town-city, and rural accessibility	4	1	3	1	3	**2.4**	**2**
	Rural governance (MPKK) and database	1	2	4	4	4	**3.0**	**3**
	Internal village amenities	5	4	2	5	2	**3.6**	**4**
	Rural spatial characters and heritage	2	5	5	2	5	**3.8**	**5**
Smart & Green Technology Practices	Rural agricultural, infrastructures, technologies and innovations	1	5	1	1	1	**1.8**	**1**
	Rural entrepreneurial technologies and innovations	2	1	4	2	4	**2.6**	**2**
	Rural marketing and e-commerce	5	2	3	3	2	**3.0**	**3**
	Smart and green technology practices	3	4	2	4	3	**3.2**	**4**
	Community-IoT-based smart technology practices	4	3	5	5	5	**4.4**	**5**

There are 3 criteria groups within the rural economic boosters & catalyst infrastructures. The relative importance level shows that the economic and rural services centre (town) become the most important (with 1.6 mean value) which ranked to level 1, and rural growth centre (RGC) and rural economic cluster (agricultural, entrepreneurial, tourism) obtained the same relative importance level to position themselves at ranking 2.

According to the mean value, within the dimension of rural characters & social well-being infrastructures, for example, efficient infrastructure has ranked to 1, followed by transportation networks of rural-town-city and rural accessibility, the lowest level of importance is rural spatial characters and heritage to rank at 5. Finally, among the five criteria groups in the smart & green technology practices, rural agricultural, infrastructures, technologies and innovations is ranked top 1, followed by rural entrepreneurial technologies and innovations, rural marketing and e-commerce, and so on (see Table 2). It indicates that agricultural remains the most important sector for rural development in Malaysia, but there is a need for it to be supported by other economic diversity as well as the smart and green technology practices, as a synergy to make rural areas grow better.

4.2 The relevant/additional criteria for modern rural development framework

The experts were encouraged to rephrase or remove any criteria that they believed duplicated another criterion, and also to suggest additional criteria that suit the aim of FMRD. Therefore, some experts took the liberty to rephrase or make minor changes to the existing criteria and suggest a number of new potential criteria. By then, the suggestions from the experts ranged from rephrasing to remove the criteria due to duplication. Other than that, about five criteria were considered to be removed because of getting only 1 score – literarily indicating the least significant.

As a result, the proposed criteria for the FMRD is 140 criteria – 70 from Dimension 1, 34 from Dimension 2 and remaining 36 from Dimension 3 – are very important to materialise the capabilities of the FMRD as a missing link for synergising rural change in sustainable and prosperous ways. These criteria need to be endorsed with a new approach towards achieving modern rural development in Malaysia.

5.0 CONCLUSIONS

This research has introduced the modern rural development framework (the FMRD) which is an integrated approach between the smart village as well as liveable and resilient concepts, aimed at synergising rural change in terms of physical, economic, social and technological practices. The FMRD is designed based on the three dimension-objectives measure which in turn comprised 13 criteria groups and 140 criteria finalised from the single-round expert view survey.

It is evident that the stages, analyses and interpretations, in this research, need to be endorsed where those elements discussed help identify the emerging new paradigm shift in villages and societies approach in the rural areas. Finally, the FMRD is a timely approach for the rural assessment to maximise the rural performance towards the future niches in Malaysia - rural sustainability-resilient-and-smart.

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