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STIMULATING THE MALAYSIAN RURAL COMMUNITY CENTRES THROUGH THE RURAL DIGITAL ECONOMY UNDER THE SMART VILLAGE ENABLEMENT PROGRAM

by

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This thesis is dedicated to my beloved family and to my supervisor, Prof Dr Wan Norhayate Wan Daud, for their support and guidance in completing this journey.

DECLARATION

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This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used the extent and nature of the correction is clearly marked in a footnote(s). Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

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ABSTRACT

The Malaysian government, through the Ministry of Rural Development, has identified the digital economy as a vehicle for catalysing socioeconomic improvement in the country, with a focus on rural communities. The introduction of the Smart Village Enablement Program would serve as the catalyst for the rural digital connectivity that drives the socio-economic program to reduce the digital division and exclusion issues plaguing the rural communities. The aim of this study was to study the development of the rural digital economy in Malaysia, specifically to identify the determinants of the initiation of the rural digital economy and analyse the impact of initiating the rural digital economy. This study also aims to recommend the framework for the Smart Village Enablement Program. The qualitative grounded theory approach was adopted loosely, adapting the Theory of Social Change to identify the factors and their expected impacts. Cluster sampling was done to select 13 Rural Community Centres (RCCs) for the studies to accurately represent the total of 191 RCCs under the ministry of rural development purview nationwide. The data collected was through semi-structured interviews with the selected 13 RCCs' managers. The findings strongly support RCC as the rural digital hub for rural communities. The RCC will help spread the rural digital economy for rural communities. The RCC would need to be strategically located, have all the required internet connectivity to facilitate the digital platform for the rural digital services, and have full empowerment of the respective RCC Managers. With the full establishment of the RCC, the relevant sustainable programmes and activities could be implemented to drive the effectiveness of the RCC, together with ethnic integration and demographic assimilation of the rural communities. The findings of this study contributed greatly to the academic's writings on the smart village conception and the rural digital economics program. Industry white papers and case studies were visibly evidenced, but the resources of the academic scholars were limited. On the other hand, there were many apparent practical business applications for the advent of rural digital and smart village enablement programs, with the obvious potential for future revenue by the respective industry players. In short, because the field was considered new and only established in the last decade, there would be many areas for future studies of the subject matter.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

This chapter would serve as an introduction to the research subject by providing the background description of the study, the statement of the problem, the aim and objectives, the questions sought, the significant contributions, and the complete definition of the key terms.

1.2 Background of the Study

The onset of the Industrial Revolution 4.0 has had a positive impact on a number of industrial sectors, including manufacturing, tourism, education, and the economy. It has sparked a shift away from the traditional way of conducting business and toward the era of digitalization and automation in terms of addressing, obtaining, and providing goods and services to clients and other stakeholders. Malaysia's economy was clearly not working well because everyone in the business world was focused on digitising and automating a lot of services in cities. This left huge gaps in the provision of basic needs for the countryside.

According to information from the Strategic Planning, Malaysian Ministry of Rural Development (2019), the difference in gross family income between rural and urban areas has grown to 40%. The survey indicated that the bulk of the disadvantaged groups lived in rural areas, which also happen to have significant unemployment rates. According to the survey, there are 7.89 million people living in rural parts of Malaysia, and 70% of them are

located in rural and remote regions in states like Sabah and Sarawak, which are in East Malaysia and the East Coast. On the other hand, many urban dwellers lived in Selangor, Penang, Melaka, and Johor, West Coast states that are also close to Singapore.

In order to narrow the economic gap between rural and urban communities, the government has developed a new agenda. According to the Ministry of Rural Development, the government has chosen the digital economy as the catalyst for socio-economic growth for the nation, with an emphasis on rural populations. As shown in Figure 1.1, the National Fiberization Connectivity Program's (NFCP) introduction of the Smart Village Enablement Program would act as a catalyst for the development of the rural digital connectivity that powers the socioeconomic programme and lessen the problems with digital exclusion and division that plague rural communities.

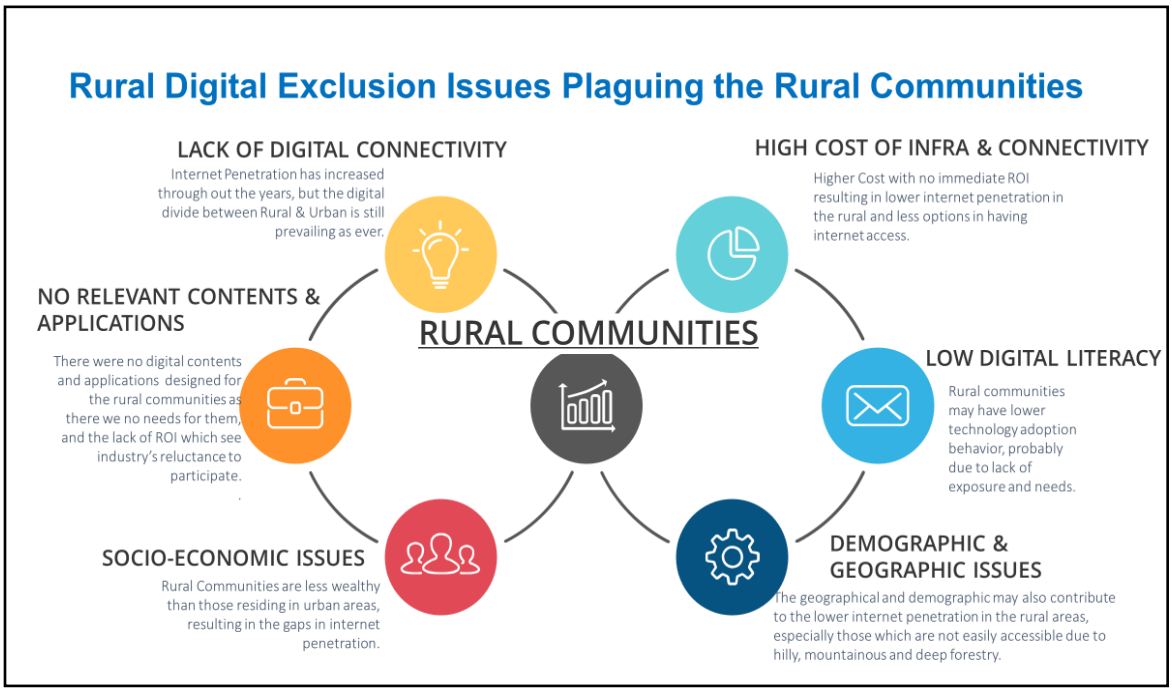

Figure 1.1 Rural Digital Exclusion Issues Undermining Development in the Rural

Rural development laid the groundwork for every developing nation's economic revolution (Ngah 2012a, 2015b). As can be seen, the majority of countries devote between 70 and 80 percent of their territory to rural development. The majority of urban development has reached a plateau, and thus the rural areas are expected to experience the next wave of expansion (Fennell et al. 2018a; Lytras & Visvizi 2018). In other words, if a country wants to get to the point where it is a developed nation with a stable Gross Domestic Product (GDP), it needs to have successful rural development projects that help rural socioeconomic development.

The GDP of the nation would rise by 5% to 10% for every improvement in rural socioeconomic conditions (Philip et al. 2015; Briones 2017). According to Philip et al. (2015), the most efficient method to deliver much-needed development to rural areas and communities is to construct a rural digital economy. Rural communities should be provided with the required digital infrastructure to accomplish this (Townsend et al. 2013). In order to create the essential socioeconomic shifts and to conceptualise the rural digital economy, Stenberg, Morehart, and Cromartie (2009) argued for the critical importance of internet digital access and services for rural areas.

Malaysia must find solutions to the problems of rural digital exclusion and division in order to achieve necessary rural development and revive the nation's GDP growth. For Malaysia's aim to become a developed country, rural development would be the only realistic course of action, with the rural digital economy acting as the new economic engine of growth (Ngah, Preston, & Azman 2010). There were numerous examples of other nations, like India, China, and Europe, successfully transforming their rural areas into smart villages to act as their nations' new economic engines of growth and development (Li

2017a; European Commission 2016; Kumar & RamaKrishna 2016). To successfully implement its own Smart Village Program and create the requisite high-speed internet connection infrastructure to eliminate rural digital division and exclusion, Malaysia would need to benchmark against these nations (Record et al. 2018). The distribution of the country's urban and rural populations was depicted in Appendix 6. Seventy-five percent of individuals resided in urban areas, while 25 percent did so in rural areas.

As a result, rural infrastructure would always be created last since urban facilities would continually need to be improved to suit the city's constantly expanding population. The industrial actors and the private sector would frequently ignore the rural and remote regions since they would have lower levels of spending than those in urban areas. This will inevitably lead to the permanent exclusion of the rural population from any potential prospects for economic progress. This continually biassed kind of economic expansion, as illustrated in Appendix 7, increased the already pronounced economic gaps between rural and urban inhabitants.

The proportion of internet users in Malaysia's urban and rural areas is shown in Appendix 8. In metropolitan areas, there are about 67 percent more internet users compared to about 32 percent in rural areas. Appendix 9's analysis of internet usage across the country reveals that people who live in crowded urban areas use the internet more frequently than people who live in rural areas (Internet Users Survey 2018). This has made the country's rural digital divide an even bigger problem. Due to acknowledged problems with the high cost of infrastructure and connectivity development, there were also several states with noticeably low internet usage, such as the eastern states of Kelantan, Terengganu, and Pahang, as well as the eastern Malaysian states of Sabah and Sarawak.

Due to the non-economical causes that led to their establishment, these states are primarily made up of rural areas with geographically isolated terrain, lacking the necessary infrastructure development and digital connectivity (Jaganathan et al. 2018; Ngah 2015b; Mohamed et al. 2012). This reinforced rural exclusion's current state in terms of infrastructural development and digital connectivity. This is particularly true for the East Malaysian states of Sabah and Sarawak, where some of the most distant places are cut off from the major economic growth hubs since they can only be reached by tiny, chartered aircraft or by means of wooden trackways. Since there are no basic telecommunications lines or digital connectivity coverage in these rural regions, news and information must travel for many days before they reach them.

The data and figures discussed above make clear the massive underdevelopment gap in rural areas. Consequently, the Industrial Revolution 4.0 or the Digital Revolution would offer the Malaysian government the chance to close the income gap that was brought on by economic exclusion and the digital divide by empowering the rural community through digital connectivity and offering a framework for economic activities and programmes to take place and the rural communities to thrive, sustain, and prosper. For this to happen, problems like the digital divide and a lack of funding, as well as a lack of digital infrastructure and connectivity, would need to be fixed right away.

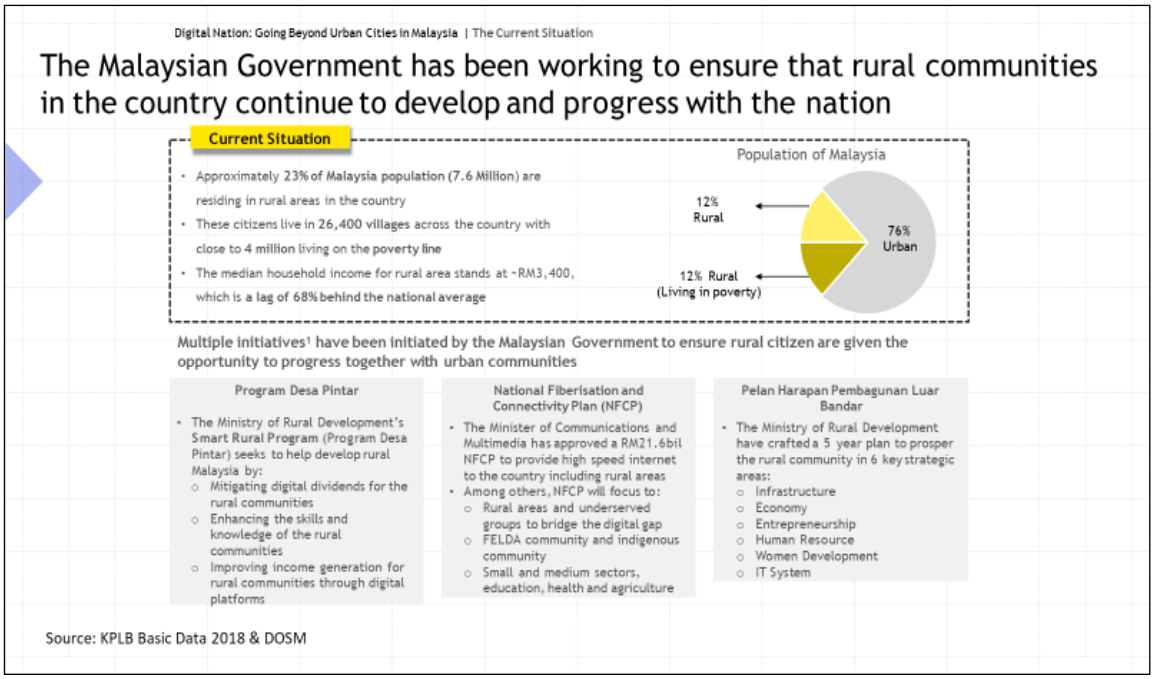

Figure 1.2 Malaysian Government's Rural Development Programs

Source: MCMC (2018), Syed Ismail (2018), Strategic Planning, Malaysia Ministry of Rural Development (2019)

Figure 1.2 shows what the government is doing to make rural areas more socially and economically stable. 10.5 million people in Malaysia, or 33 percent of the total population, live in non-urban (including rural) areas. The typical monthly household income in the rural area was roughly RM3,400, or 68 percent less than that of the urban area, which was almost RM5,860 (Strategic Planning, Malaysia Ministry of Rural Development 2019; Ministry of Rural Development 2018b). Therefore, the Smart Rural Program (Smart Village Program) of the Ministry of Rural Development aims to promote rural Malaysia in three key ways. In order to improve the skills, knowledge, talents, and capabilities of rural communities, we must first narrow the digital divide for these people. The third phase is to use digital platforms to create new potential sources of revenue for

rural people.

In order to promote high-speed digital internet connectivity via fibre optic cable networks and ensure that rural citizens have the opportunity to participate in the rapidly accelerating global digital wave, the Malaysian government has announced the National Fiberization and Connectivity Plan (NFCP) as the National Digital Agenda (MCMC 2018b; National Fiberization and Connectivity Plan (NFCP) 2020). About 3.3 million rural and suburban households that are now using outdated copper infrastructure with substantially slower internet speeds are the target audience for the NFCP's high-speed broadband (HSBB) services (MCMC 2018). The government considered the provision of HSBB to be essential for rural residents' survival and prosperity (Bernama.Com 2019; Heng 2020; Alita 2020). This would entail the study of potential and chances in applied technologies like meta-aggregators, mobility as a service, mobile application distribution channels, and other pertinent rural digital services and applications by Malaysians in the countryside.

Under the Smart Village Enablement Program, this could only be accomplished by converting the existing rural community centre into a rural digital hub (Ashmore et al. 2019; Garner 2019; ENRD 2017b; Soto 2019). High-speed internet access and the ensuing digital platform would be the Rural Digital Hub's sources of power, enabling the services and the rural digital eco-system. Without this change, rural areas would still be left out of the economy, especially during the COVID-19 Pandemic and Endemic era.

1.3 Problem Statement

The authors of Várallyai, Herdon, and Botos (2015) and Mohamed et al. (2012) both emphasise the importance of addressing the issues that contribute to digital divides and economic exclusion between rural and urban areas. On the factors that contribute to the rural digital gap, Feldmann (2018), Jaganathan et al. (2018), and Ashok (2018) have all made comparable claims. They cite factors such as a lack of digital connectivity, high infrastructure and connectivity costs, a lack of pertinent digital apps and information, and low digital literacy as the causes. In addition, they stressed that socioeconomic factors, regional factors, and demographic factors are all influencers.

Figure 1.3 depicts the pervasive rural digital gap that exists in Malaysia and keeps rural areas out of the mainstream information age.

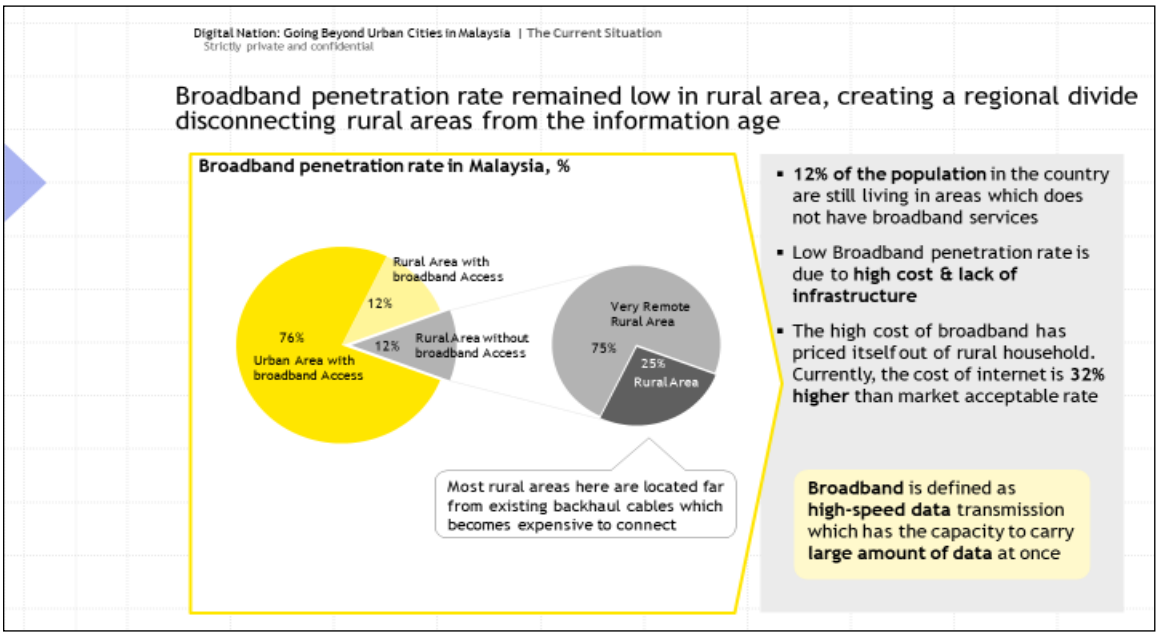

Figure 1.3 Broadband Penetration Rate Remained Very Low in the Rural Area and the Creation of Rural Digital Divide
Source: MCMC (2017) and Mohamed et al. (2012)

The digital divide has persisted despite greater national internet adoption, according to the Malaysian Communication and Multimedia Commission's annual report (Hanafiah 2016). Despite an increase in Malaysia's overall population's gross household income, income gaps between rural and urban residents continued (Ministry of Rural Development 2018a). The physical and topographical topography of remote and rural locations has made it more challenging for telecoms and service providers to offer enough digital connectivity. Additionally, the necessary technology was unable to economically and cost-efficiently develop the necessary digital internet connectivity infrastructure because there was clearly insufficient demand to recoup the investment costs (Network Performance Report 2018; Quantifying the Value of Digital Infrastructure Development 2017). In the future, rural areas will be filled with older people who are less likely to be able to use digital technology (Philip & Williams 2019; Philip et al. 2017a; Correa & Pavez 2016). This will lead to low levels of digital and technology adoption in rural areas.

The main barrier to reducing the rural digital gap will continue to be digital connectivity to end users in rural and remote areas (Mohamed et al. 2012; Ashok 2018; Wang 2013). This was because creating digital links and gaining the accompanying returns on investment were expensive (Cheuk et al. 2018; Brake 2017). Tanvig et al. (2018) and Brake (2017) recommended that, in order to hasten the deployment of digital connections in remote and rural areas, the government play a proactive role by creating a digital national agenda. Figure 1.4 illustrates the significant expense of giving rural areas decent high-speed internet connectivity, denying them access to the mainstream information age, and depriving them of good internet connectivity. But the introduction of the government's NFCP would help to address this issue of the rural digital divide (MCMC 2018b;

Ramanathan, King, & Azizan 2020; Kugan 2019).

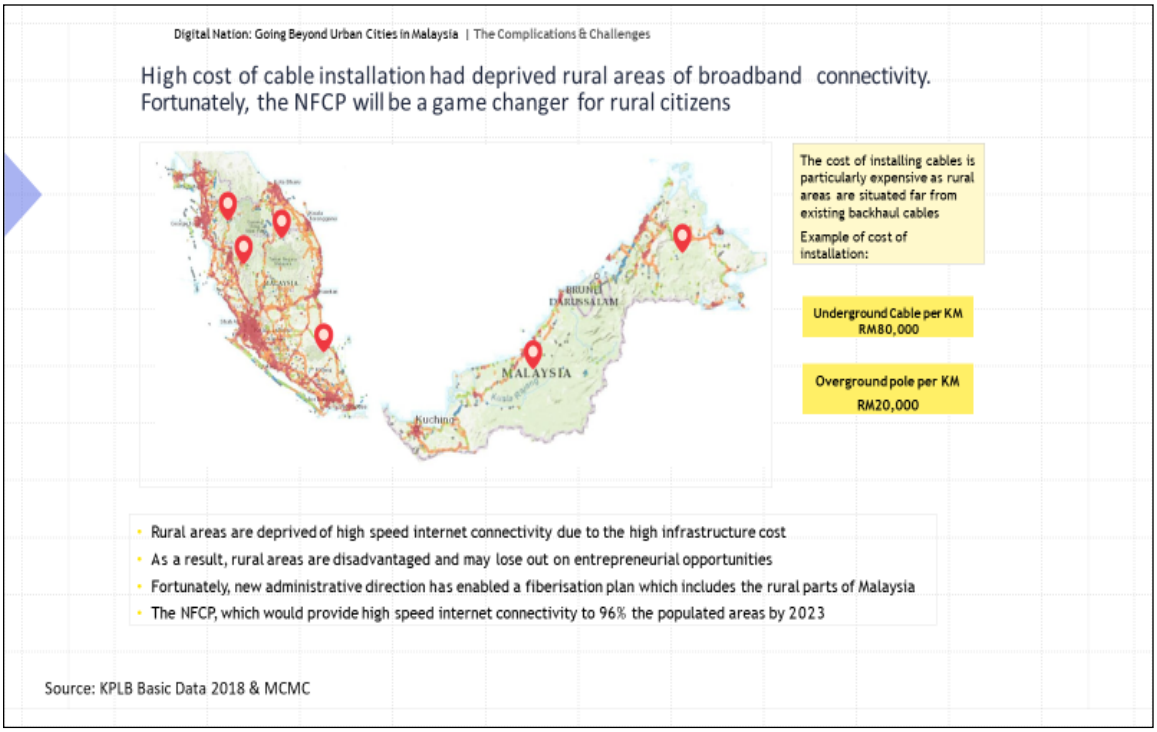

Figure 1.4 The High Cost of Providing High Speed Digital Internet Connectivity
Souce: MCMC (2018)

In order to ensure that rural communities have the essential digital literacy, the proper digital material, applications, and smart devices should also be made available to them (World Economic Forum 2017; Approaches to National Digital Governance 2017; Tanvig et al. 2018). The socioeconomic development plan for rural areas could only be properly achieved if these issues were resolved by employing the digital economy to transform their daily activities and trades (Ashok 2018; Soto 2019; Roberts et al. 2017a, 2017b). In other words, the digital economy would serve as the impetus for a general transformation of the socioeconomic well-being of rural communities (Alam, Ismail, & Najib n.d.; Lovelock 2018; Record et al. 2018; Vineles 2018). Rural digital inclusion

(Fahmi & Sari 2020; Tanvig et al. 2018) is the ability of rural communities to accept the rural digital services needed for the daily routine of new digital lifestyles.

Meanwhile, the COVID-19 pandemic outbreak has severely disrupted our way of life and our enterprises (Asean Policy Brief 2020). It was a global epidemic that had brought about a total collapse of the global economy. The pandemic's contagious features have led to numerous activities and initiatives being done entirely online, despite the fact that some countries have started to open their markets. This has provided more evidence of the urgent need for Malaysia to reduce the digital divide in rural areas so as to prevent increasing exclusion and the complete isolation of rural residents from the mainstream economy. Furthermore, between 70% and 80% of rural populations could be excluded from any government-led economic stimulus programmes aimed at revitalising the post-Covid-19 pandemic era (Asean Policy Brief 2020; Rohaizat 2020).

Salemink, Strijker, and Bosworth (2017) gathered and reviewed a sizable number of scholarly articles and journals that overwhelmingly support the idea that rural digital is a crucial economic driver for the advancement of rural communities in European nations by promoting rural digital inclusion and bridging the rural digital divide. The notion was further supported by Freeman and Park (2015), who looked at how rural Australians adopted digital internet connectivity, which also encouraged rural participation and improved rural economic activity via digital platforms and services. Yu (2018) also made the case that the government ought to create and carry out a National Broadband Connectivity Agenda in order to support national digital and internet connectivity infrastructure and foster adoption and digital literacy through strategic training and development programmes, as China has done successfully.

As a result, the recently launched National Fiberization Connectivity Program (NFCP) in Malaysia could be the ideal first step in addressing rural digital connectivity and boosting the rural digital economy (Wahab 2019; Stenberg, Morehart, & Cromartie 2009; Philip et al. 2015). Considering that the introduction of digital connectivity will improve service delivery and the supply chain, Figure 1.5 forecasts the potential yield that the rural digital economy may offer. Additionally, it would facilitate quicker e-commerce and digital platform access to the market.

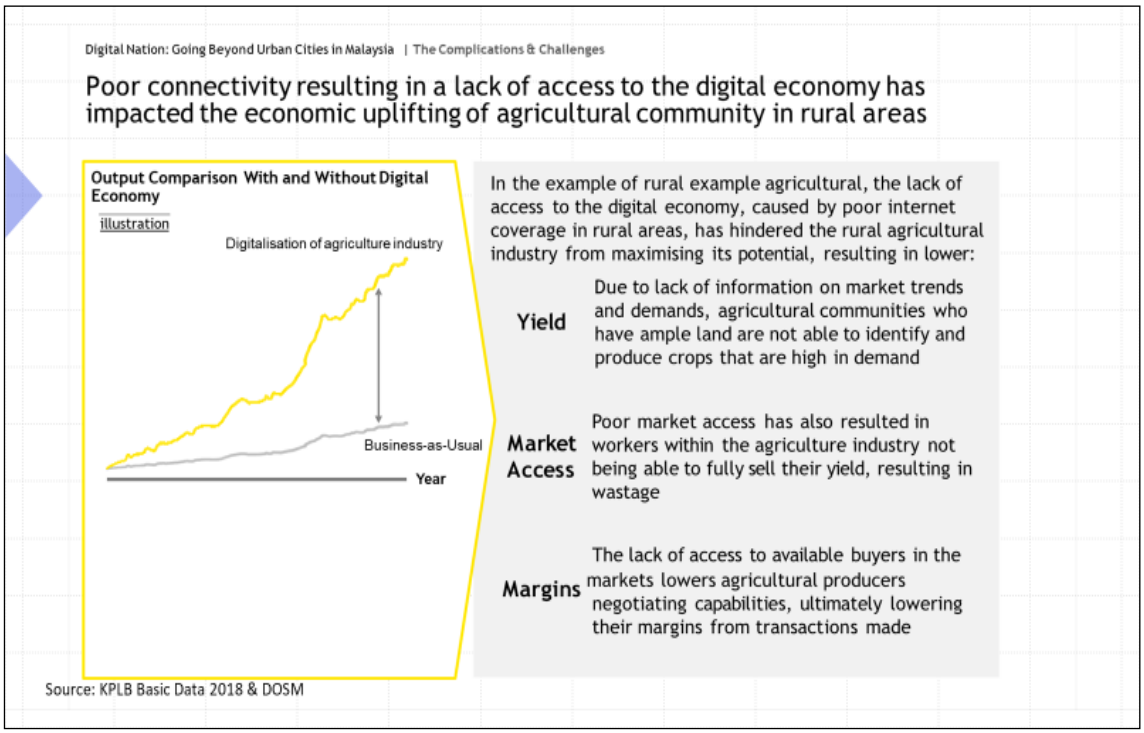

Figure 1.5 Estimation of Increase in Potential Yield If Rural Digital Economy Was Put in Place

Source: Philip et al. (2015) and Chamberlain et al. (2012)

However, the knowledge of the rural digital economy in Malaysia is rather limited. Thus, this study is motivated to understand the stimulation of the Malaysian rural community centres through the rural digital economy under the Smart Village Enablement Program by identifying the determinants of the initiation of the rural digital economy in Malaysia, analysing the impact of initiating the rural digital economy in Malaysia, and recommending the framework for the Smart Village Enablement Program to initiate the rural digital economy in Malaysia.

1.4 Research Objectives

The primary aim of this study was to study the development of the rural digital economy in Malaysia. The Malaysian government's National Fiberization Connectivity Program (NFCP) would provide rural Malaysia with much-needed high-speed digital connectivity and infrastructure. This would enable the creation of the Rural Digital Hub, which, as suggested by the Theory of Social Change, would be the catalyst for the much-needed rural social transformation to stimulate the rural digital economy (Alias et al. 2011a; Philip et al. 2015). Ashmore, Price, and Deville (2019) say that the Rural Digital Hub would be a new way to help rural communities become more economically and socially stable. Henceforth, the specific research objectives are:

1. To identify the determinants of the initiation of the Rural Digital Economy in Malaysia.
2. To analyse the impact of initiating the Rural Digital Economy in Malaysia.
3. To recommend the framework for the Smart Village Enablement Program to initiate the Rural Digital Economy in Malaysia.

1.5 Research Questions

This study attempts to find answers for the following research questions:

1. What factors will influence the start-up of Malaysia's rural digital economy?
2. What would be the impact of launching the Rural Digital Economy via the Smart Village Enablement Program, and how would it benefit rural communities?
3. How does the framework link the Rural Digital Hub to the identified factor determinants under the Smart Village Enablement Program in initiating the Rural Digital Economy in Malaysia?

1.6 Significance of the Study

1.6.1 Theoretical Contribution

The purpose of this study was to examine the connections and linkages between the rural digital hubs established under the Smart Village Enablement Program to jumpstart the rural digital economy for the rural communities. These connections and linkages would be investigated and compared to the Smart Village Basic Ecosystem Framework, as shown in Figure 1.6. Viswanadham and Vedula (2010) proposed that a smart village should have these basic eco-systems: the institution of the said villages, the supply chain supporting the villages, the local resources, and the relevant service delivery infrastructure to support the village communities.

The Theory of Social Change would serve as the guiding grounded theory for enabling the Smart Village Program to affect socioeconomic change and transformation for the betterment of the rural communities studied through the promotion of social connectedness and relatedness; the two critical factors for propagating rural social inclusion and rural digital dividends (Alias et al. 2011a; Shapiro 2006).

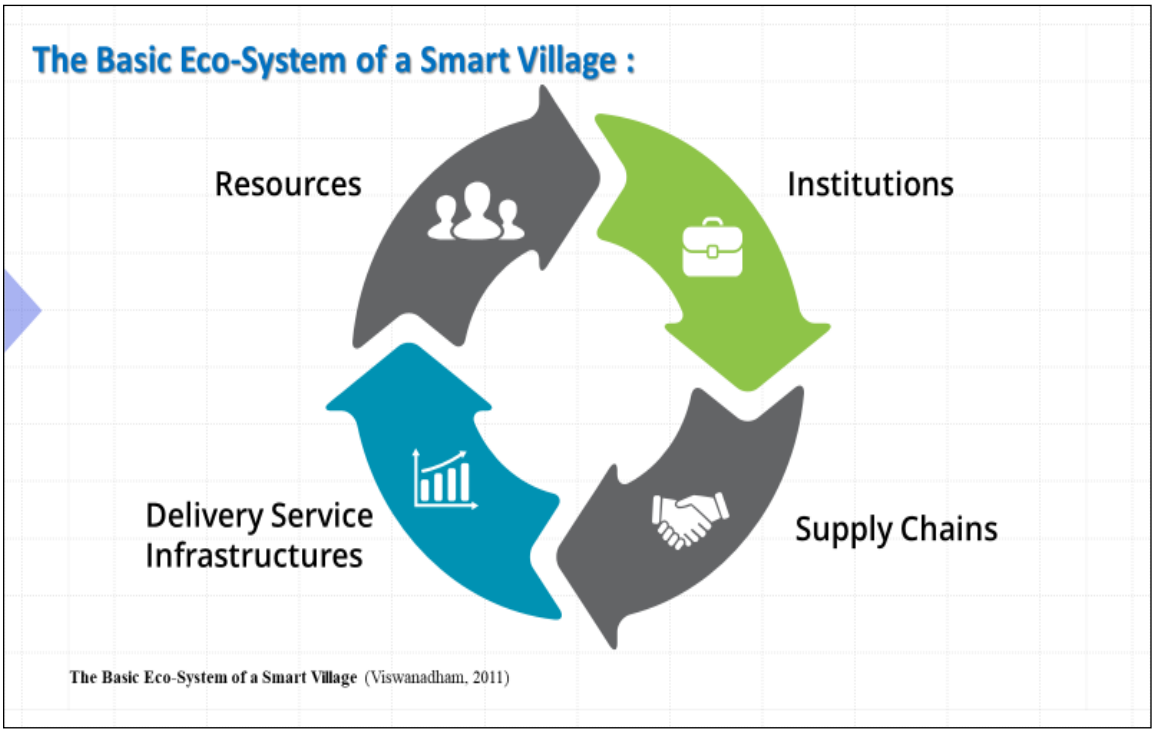

Figure 1.6 The Basic Eco-System of a Smart Village

Source: Viswanadham and Vedula (2010)

Currently, there are some gaps in the literature relating this study to the common seminal theories and models guiding the development of contemporary Smart Village programmes. There were many white papers and case studies on the subject matter, but not many were published as academic writings to be used as literature evidence to support those smart village conceptions. Hopefully, this study will significantly add to the academic literature on the Smart Village Concept and the associated subject matter, allowing for future research and application in other rural regions around the globe.

This effort would also help to advance the idea of social change effectiveness by allowing the necessary rural digital services under the Smart Villages Conceptual Proposition. The rural digital economy would be stimulated by the establishment of a rural

digital hub to ensure long-term rural digital inclusion and to help reduce the rural digital divide (Ashmore, Price, & Deville 2019; ENRD 2017b).

1.6.2 Practical Contributions

The study's underlying practical contribution to the improvement of rural communities was undertaken by Telekom Malaysia, a government-owned telecommunications firm, which had presented the proposal on the Smart Village Proposition Concept to accelerate the nation's digital agenda, as mandated by the government. This proposal is contained in Appendix 26. These objectives would be accomplished by using funds from the government's National Fiberization Connection Program (NFCP) to create the necessary high-speed digital connectivity and infrastructure. After establishing the necessary high-speed digital connectivity and infrastructure at all the 191 existing Rural Community Centres across the country, the next phase of transforming these centres into Rural Digital Hubs would be accomplished by establishing and completing an overall Smart Village Digital Eco-System, as adapted from Figure 1.6.

The study's practical contribution would be the socioeconomic enabling of the rural communities in Malaysia by promoting rural digital inclusion and reducing the rural digital divide. The proposal of Rural Digital Hubs or Centres as the Malaysian Ministry of Rural Development's Smart Village Enablement Program was not a novel or untested concept. There were many instances when other regions and countries adopted the Smart Village proposition in order to revitalise their rural communities and provide socioeconomic development services (Heap 2015a; European Commission 2016; Holmes 2017; Kumar &

RamaKrishna 2016; Ranade, Londhe & Mishra 2015; Soto 2019; Ramesh 2018). Additionally, rural areas ought to have access to high-speed broadband and digital connectivity in order to make the socioeconomic enablement programme viable (Stenberg, Morehart & Cromartie 2009; Ellis 2012; Tanvig et al. 2018).

Due to an excessive emphasis on urban expansion and an unrealistic emphasis on the regional development regions, Malaysia has reverted to prioritising its rural development agenda (Ngah 2015b, 2012a). At the moment, two countries, China and Indonesia, have shown the value creation of their rural socioeconomic enablement programmes in converting the rural poor into rural entrepreneurs by providing digital services vis-a-vis the establishment of the Rural Digital Economy platform (Wahab 2019). This study would significantly aid in ensuring Malaysia follows suit, with the recent launch of the Smart Village Program on top of the National Fiberization Connectivity Plan (NFCP) to catalyse the rural digital inclusion and reduction of the rural digital divide in Malaysia's rural communities (Bernama.Com 2019; Daily Metro 2019; Kugan 2019; Ramanathan King & Azizan 2020).

1.7 Scope of Study and Limitation

The study's scope has been narrowed down to generally looking at Rural Digital Inclusion and the Rural Digital Divide. Additionally, the emphasis would be restricted by the rural setting of Malaysia and would be heavily influenced by the social and cultural limitations inherent in the area. The study would use the location of the Proof of Concept pilot project at the Rural Community Centre Kompleks Penghulu Bukit Kepung Johor as the jumping off point for the inductive process aimed at explaining the relationships and linkages between the determinant factors and the impacts of the Rural Digital Hubs in promoting rural digital inclusion and bridging the rural digital divide for the rural communities. This would subsequently be extended to include the rest of the 190 Rural Community Centres located nationwide.

1.8 Definition of Key Terms

1.8.1 Rural Development

Rural development is a process of change with the objective of improving the socio-economic conditions of rural communities (Ngah 2015b). As such, rural development would also require mandates from the federal, state, and local municipal authorities to initiate change phases from the planning, implementation, and into the monitoring and coordination phases. Along the line, consensus building with the various critical stakeholders was required to ensure a sustainable rural development programme (Garner 2019; Ngah 2012a).

1.8.2 Smart Village

Smart Villages were defined by many things, depending on the locality's needs and the countries and continents where they were conceived. In India, Smart Village was defined as a new rural development programme for the long-term improvement of rural communities' socioeconomic conditions (Talpa Sai 2016; Gangani, Dungrani, & Jadeja n.d.).

Smart Village Conception would also include other components such as Smart Services Delivery, Smart Infrastructure, Smart Technology and Innovation, and Smart Institutions (Deshmukh, Satput & Rajebhosale 2018). In Europe, Smart Renewal Energy was also included as an important and crucial component of the Smart Village Proposition (European Commission 2016; Heap 2015).

Smart Villages Conception would be defined in the context of this study as a new rural development programme designed to bring about new innovative digital smart service solutions to rural communities in order to improve their resilience and optimise their local strength and opportunities (Garner 2019). The ultimate objective would be to improve the social and economic well-being of rural communities. In order to ensure this innovation and improvement were sustainable, all the current factors contributing to the Rural Digital Exclusion and Divide would need to be identified and removed (Wang 2013a; Roberts et al. 2017a).

1.8.3 Rural Digital Hub

Rural communities, unlike those in urban areas, are not exposed to information and communication technology (ICT) and digital smart services. One of the major issues in rural areas was a lack of digital literacy (Mohamed et al. 2012). As a result, a Rural Digital Hub would need to be formalised as a gathering place for rural people to gather for commerce and other governance services (Shahriar et al. 2014a; Ngah 2012a). The Rural Digital Hub would also serve as the place where all training and awareness programmes could be undertaken, as well as a hub for the digital node to host all the required digital smart services as well as for the digital connectivity element node to be located (SARKAR 2018; Chigbu 2013).

1.8.4 Rural Digital Inclusion

Digital Inclusion would simply mean the capacity and capability of people to access and use information and communication technology (ICT) and Digital Smart Services (Digital Inclusion 2019). It would entail a rural development programme to address the interrelated issues of digital divide and digital literacy in rural communities. In other words, it would be the rural communities' capabilities and capacities to learn, access, use, and adapt as part of their lifestyles (Real, Bertot, & Jaeger 2014).

1.8.5 Rural Digital Divide

The Digital Divide was defined as the gap in getting access to and services in regard to information and communication technology (ICT), the Internet, and digital services (Digital Divide-ICT Information Communications Technology 2020). This would be very prevalent in rural areas that have poor internet and digital connectivity. Rural Digital Exclusion would be more related to the socioeconomic impact of the Digital Divide (Labrianidis & Kalogeressis 2006; Chen 2003; Townsend et al. 2013).

1.8.6 Rural Digital Economy

The Digital Economy is the aftermath of the impacts caused by digital technologies on many aspects of the rural lifestyle (Philip et al. 2015; Lovelock 2018). These digital technologies and platforms would give rise to e-commerce, which would be the backbone of the advent of a digital economy (Yu 2018; Stenberg, Morehart, & Cromartie 2009).

Simply put, the Rural Digital Economy would be the benefits accrued as a result of the introduction of internet connectivity and services to rural communities (Philip et al. 2015). This would give rise to various other digital and on-line services which could greatly catalyse the socio-economic uplifting of rural communities, such as Rural e-Commerce, or e-Marketplace, and other smart services (Chamberlain et al. n.d.; European Union 2018; Wolski & Wójcik 2019; Wahab 2019).

1.9 Organization of the Dissertation

This dissertation is segmented into five chapters. Chapter One looked at the historical context of the research agenda, as well as the issue description, the resultant research questions, and the goals that the study aspires to accomplish in the first place. The significance of the research, as well as the scope and limits of the study, were highlighted in the chapter.

Chapter Two examines the literature related to the subject matter of Smart Villages Idea and Proposition, as well as the many determining variables that contribute to the conception. In addition, the chapter also examines the underlying and theoretical models used as the basis for this study with a view to guaranteeing long-term rural digital inclusion and digital divide mitigation. It would also address the gaps and variations between comparable programmes implemented in other nations and regions. The research technique used for this study is also briefly discussed in this chapter.

Chapter Three, on the other hand, includes the study design, the population, the sampling, the procedures for data collection, the data analysis, and ethical considerations. This is the section of the meeting when the data collection and analysis procedures are reviewed in detail, as well as the methods of data collection and analysis.

Chapter Four is devoted to the outcomes and conclusions that were drawn from that study. This seems to be the most important part of the paper, as it attempts to prescribe a theoretical framework for the Smart Village Enablement Program, which will then be implemented across the country.

Chapter Five is the concluding chapter that includes a summary of the results of the investigation. In addition, the chapter emphasizes the ramifications of the research while intentionally drawing attention to the shortcomings of the study in question. The chapter recommends other topics for study in the not-too-distant future.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This study proposed the transformation of the Rural Digital Hubs from the current Rural Community Centres under the Smart Village Enablement Program to establish the Rural Digital Economy to bring about socio-economic betterment for the rural communities. This chapter extensively reviews the literature relating to the research, which would include the underpinning theory behind the Smart Village Proposition. The chapter also discusses the relationships between the variables involved, which would later serve as the foundation for the new proposed theoretical framework.

2.2 Rural Development

Rural development is the backbone for the growth and sustainability of any country's economy (Singh 2019). Malaysia achieved independence from the colonial British rulers in 1957. Moreover, even under colonial British rule, rural development was critical to the nation's progress. Initially, the task of carrying out various rural development programs was very much synonymous with the socio-economic programs of eradicating poverty, improving rural infrastructure, providing public facilities, developing mass rural agricultural land, rural industrialization, establishing rural community program activities, and opening up and resettling new villages (Ngah 2009).

2.2.1 Rural Context in Malaysia

Malaysia is a small country with about 30 million people, 70% of whom reside in rural and remote areas in states such as the East Coast and East Malaysia in Sabah and Sarawak (Ministry of Rural Development 2018a). Many of the city folks were residing in urban areas in the West Coast states, such as Selangor, Penang, Melaka, and Johor, which are also near Singapore. The nation's business and capital cities, Kuala Lumpur and Putrajaya, are also located in Selangor.

The rural communities were mostly involved in farming, fishing, and forestry industries for their socio-economic activities. There were also some noticeably small activities in manufacturing and small retail and trading, mainly spawned from the rural villages' agricultural, farming, and fishing activities, as well as homestays and eateries (Ministry of Rural Development 2018b; Ngah 2009). People in cities, on the other hand, were very active in the manufacturing, wholesaler, and retailer industries, as well as many other sectors.

These sectors would generate more income and revenue for urban residents, providing a higher income per household for urban households (Ngah 2015c). Sectors in which the rural communities were involved did not yield higher income and revenue growth for them. In short, the current economic activities in the rural areas could be further explored and rejuvenated if given the right incentives and attention by the government.

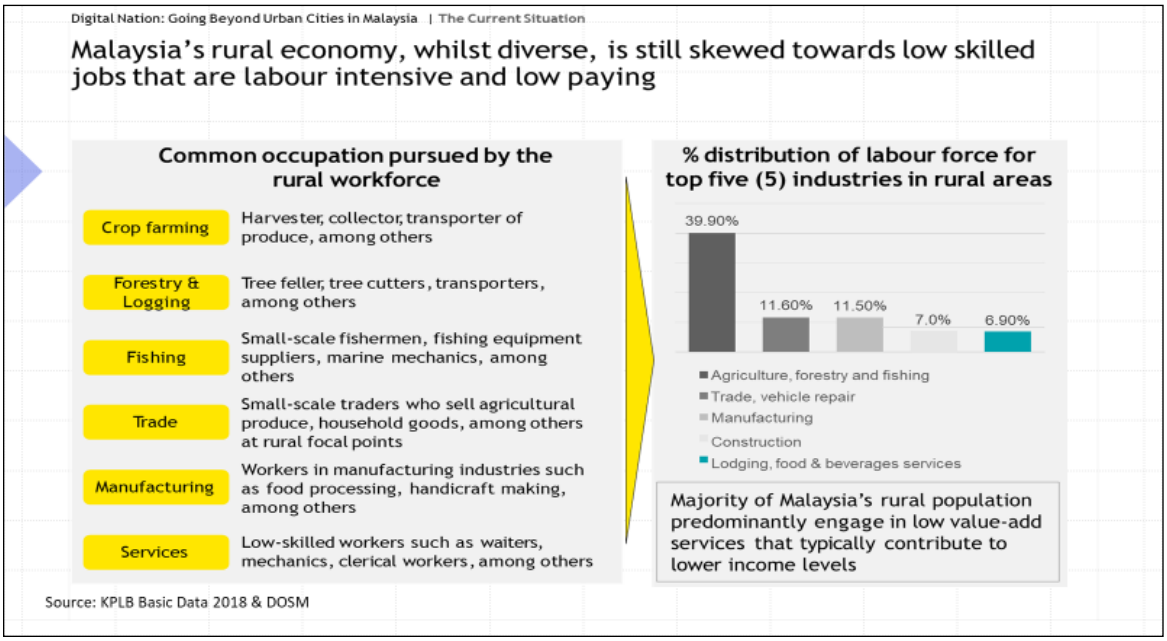

Figure 2.1 Malaysia's Rural Economy Skewed More Towards Low-Skilled Jobs and Salaries

Source: Strategic Planning, Malaysia Ministry of Rural Development (2019)

Figure 2.1 illustrates the typical rural socio-economic pattern currently prevailing in all the rural areas in Malaysia. Due to the rural digital divide and economic exclusion issues, many of these activities yielded lower levels of income than would otherwise be possible (Wolski 2019; Trendov, Varas, & Zeng 2019). Common occupations pursued by the typical rural workforce in Malaysia would be crop farming, forestry logging, fishing, rural small trading, traditional manufacturing such as home food processing, handicraft making, and low-skilled jobs such as waiters, mechanics, and clerks. In addition, because these natural resources are abundant in Malaysia's rural areas, most socioeconomic activities revolve around agriculture, forestry, and fisheries (Ministry of Rural Development 2018b; Ngah 2015b; Book on Malaysian Rural Development Framework 2019).

In addition, due to the same resulting barriers from the rural digital divide and economic exclusion, rural household incomes were much lower than those of urban households (Haenssgen 2018; Correa & Pavez 2016). There were not many job opportunities with good salaries in the rural areas, especially if there were no major urban areas within the vicinity (Ngah, Kamarudin, & Saad 2016; Hadi 2018; Hindman 2000).

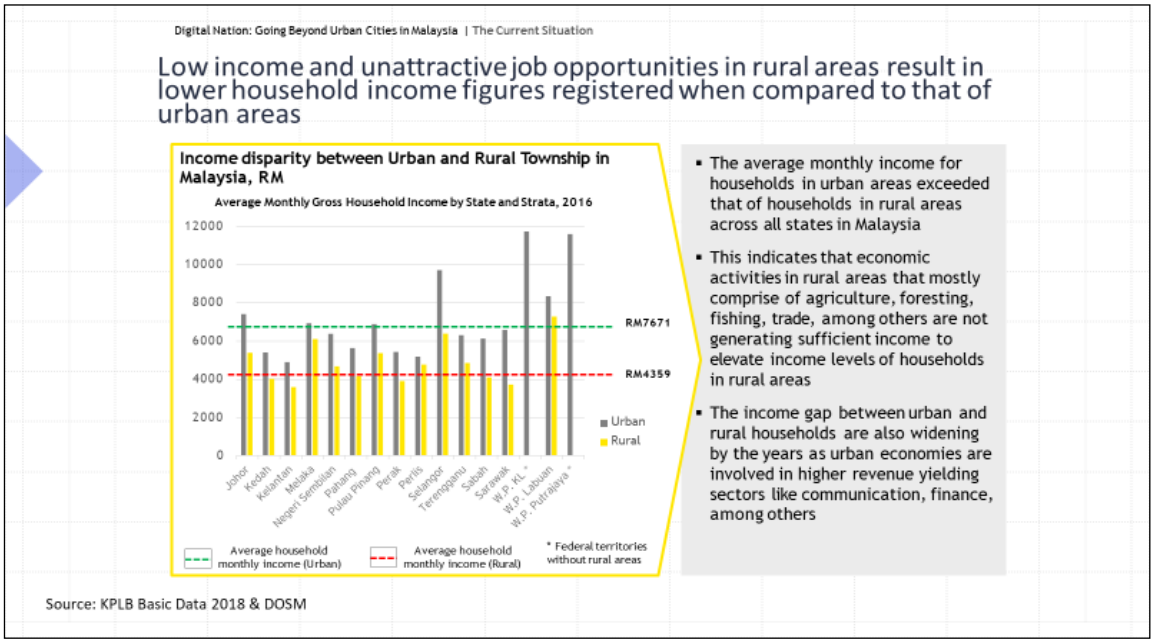

Figure 2.2 The Rural Low Incomes and Poor Job Opportunities Had Resulted in Lower Rural Household Incomes, in Comparison to Those in the Urban

Source: Ministry of Rural Development (2018b)

Figure 2.2 elaborates on the issues of lower rural incomes and unattractive job opportunities. On average, cut across all the states nationwide, urban household incomes were at RM7,671 per household, in comparison to rural household incomes, which were at RM4,359 per household (Ministry of Rural Development 2018b). The average monthly income for households in urban areas exceeded that of households in rural areas across all

states in Malaysia.

The economic activities in rural areas, mostly comprised of agriculture, foresting, fishing, and trade, among others, were not generating adequate income to uplift the income levels of households in the rural areas. Consequently, the income division between urban and rural households has continued to widen over the years as the urban economies became more involved in higher revenue-yielding sectors such as communication and finance (Hindman 2000; Philip et al. 2017a; Strategic Planning, Malaysia Ministry of Rural Development 2019).

Tertiary education would enable the possibility of achieving higher salaries for the rural communities, but the participation rate remains low in all of the rural areas of the country (Ministry of Rural Development 2018b; Henry 2019; Mohamed et al. 2012). As shown in Appendix 10, education could be a key factor in closing the growing income gap in the country. Unfortunately, the participation of the rural communities in higher levels of education was still lacking, compared with that of the urban areas (Wang 2013b; Hadi 2018). For example, the indigenous community, which resided in the deepest rural remote areas, contributed to the highest percentage of total dropouts in the country, an increase from 36% in 2015 to 51% in 2018 (Glass 2019; Ministry of Rural Development 2018b; Ngah 2015c).

Appendix 11 showed the topography and the population distribution throughout the country, with those in red, orange, and yellow denoting the areas of urbanisation with high population density. Those in green were the rural areas, with the lightest green denoting the least populated. This showed that the majority of the country's countryside was made up of rural areas that were the least populated. Most of the densely populated areas were the urban

areas along the west coast of the country. Incidentally, the rural development strategic programmes were initiated, planned, and executed with the aim of the betterment of the rural communities. This change process would be a continuous process and it would cross-cut into multiple federal and state agencies, with some participation from non-government organizations (NGOs) as well as private sectors (Ngah 2009, p.20).

Through the years, these rural development strategic programmes have evolved from purely providing basic infrastructure development and public facilities into provisioning and introducing new modern techniques and technologies for rural agriculture and the related supply chain management system. This would also include the formation of many governmental agencies that would be looking at the niche requirements for the rural communities' agricultural, farming, and fishing sectors (Ngah et al. 2005).

However, the directions of rural development were still based on the theoretical frameworks of socioeconomic development and political economy at the time (Ngah 2009). The attention to providing rural internet connectivity was left purely to the much later established Ministry of Multimedia and Communication, which was more preoccupied with providing high-speed internet connectivity and fiberization of the urban areas and capital states and cities (Hanafiah 2016; Mohamed et al. 2012).

2.2.2 Overview of the Rural Development Strategy

Figure 2.3 shows the overview of the Malaysian Rural Development Strategy since right after national independence in 1957. For the next decade, the rural development programme was specifically designed to open up new land development for village resettlement as well as provide basic infrastructure for the basic necessities such as water and electricity, roads, and other basic public facilities such as community halls and places for worship. This was in line with the government's priority at that time on providing the basic necessities for the betterment of rural community development (Ngah 2012a; Ngah Preston & Azman 2010). It was only in the 1970s that the government started planning and implementing the rural development programme with greater emphasis on generating economic growth in the rural areas under the New Economic Policy mandates.

This would include restructuring society in order to redistribute the economic wealth of the urban to the rural communities, which are primarily made up of indigenous Malays and Indigenous (*Orang Asli*) ethnic groups. Some of the programmes were massive new land development schemes and regional development in-situ, which were successful in creating new townships and populated places in the rural areas. These rural development programmes would be expanded over the next several decades, with new regional development areas and socioeconomic programmes (Ngah 2015a).

The internet explosion would come to Malaysia in the 1990s, which resulted in the government switching their priorities to providing high-speed internet connectivity via fiberization and broadband wireless 3G, 4G, and LTE. The creation of the new ministry, the Malaysian Ministry of Communication and Multimedia, was the result of the change of

emphasis, with more focus on urban areas and the creation of new urban townships such as Putrajaya and Cyberjaya (Hanafiah 2016).

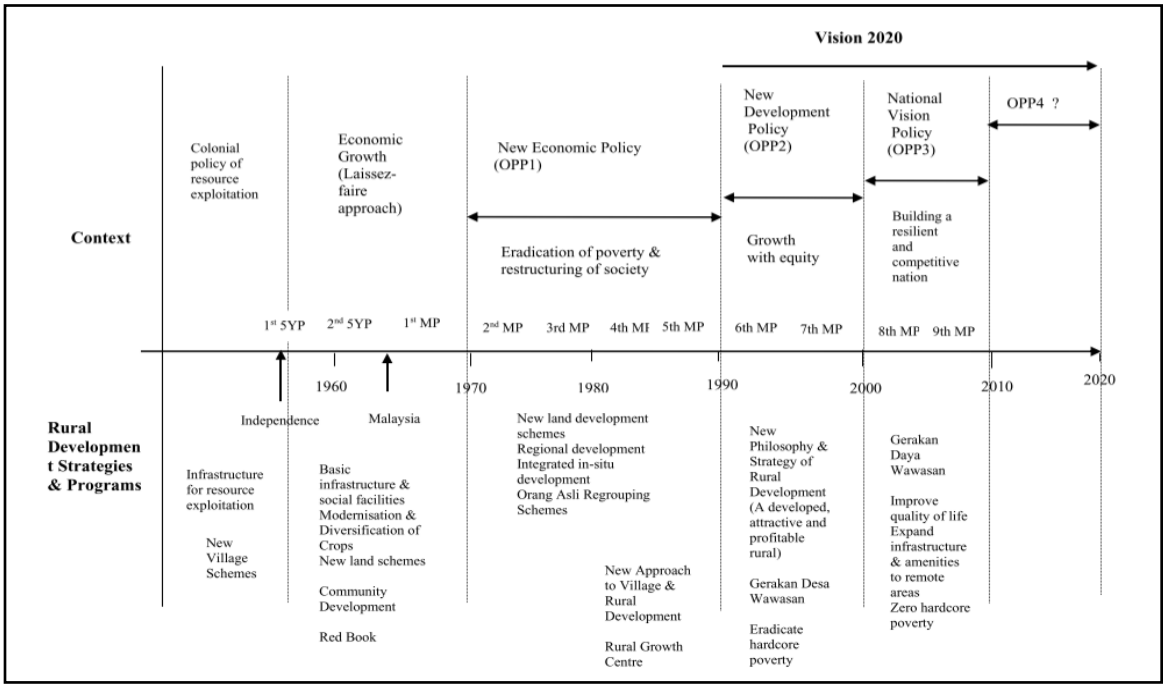

Figure 2.3 An Overview of the Malaysian Government Rural Development Strategies
Source: Ngah (2009)

When the resulting rural digital divide inadvertently created a large rural economic exclusion, the Malaysian Government Agenda was impacted (Mohamed et al. 2012; Jaganathan et al. 2018). The rural areas lacked high-speed internet and digital connectivity, resulting in the rural communities' being excluded from the mainstream online social media and digital content applications (Cheuk et al. 2018; Grimes 2003; Chen 2003). The Ministry of Rural Development has tried to mitigate the rural digital divide with their Rural Transformation Centre (RTC) program, but to no avail, due to poor internet connectivity and the high cost of providing it. Appendix 19 shows the types of internet connectivity at

all the RTC/ RCC. More than 80% have poor internet connectivity and about 50 have no internet connection at all.

2.2.3 Rural Transformation Centre (RTC) of Malaysia

Previously, the main aim of rural development under the Malaysian Government Ministry was to improve the basic infrastructure and necessities for the rural communities. Therefore, the rural development programme would need to evolve from merely looking at income-related factors to become more inclusive, bringing the rural community back into the mainstream of modern society's information media and lifestyles. This is where the concept of Rural Transformation Centres (RTC) would come into play, empowering rural communities with rural development programmes to strengthen the three core elements critical to nation-building: economic, social, and political (Shahriar et al. 2014a; Ngah 2012b).

The Rural Transformation Centre (RTC) programme was the old name given to the current Rural Community Centre (RCC), albeit there are not many differences in the roles and functionalities. This RTC was the third-generation rural development strategic programme undertaken by the Malaysian Ministry with the objective of transforming and empowering the rural community by bridging the digital divide and including them in the mainstream of modern society. The RTC was set up for the rural communities within an average radius of 100 km or more, depending on the tabulation of the rural people in the remote and interior states (Shahriar et al. 2014b). These RTCs were set up to provide eight major initiatives for rural communities.

As mentioned by Shahriar et al. (2014b), there are eight functions of the RTC. These functions including acting as a training centre for the rural population and as a One-Stop-Centre to host the 1Malaysia information kiosks. It also serves as a rural hub for high-value agriculture initiatives, for agro-food product processing, agricultural produce supply chain management, university cooperation and provides financial services to rural populations. Other than that, it also provides food safety and pharmaceutical services.

Alias et al. (2011) were strong proponents of this third-generation rural development strategic program, which resulted in the advent of his espoused theory of change for the Rural Internet Centre conception as shown in Figure 2.4. Under the proposed theory of social change, the planned RTC by the Malaysian Government Ministry of Rural Development was aimed at providing basic ICT services and connectivity to enhance the rural community's access to information and knowledge, as well as providing the psychological aspect of ICT, which enhances the rural community's sense of social connectedness and empowerment (Alias et al. 2011a). Roberts et al. (2017) also arrived at the same conclusion in the study to gauge the rural community's resilience, which was the capacity for the said community to proactively adapt and evolve through the continuous embrace of ICT technology knowledge and services.

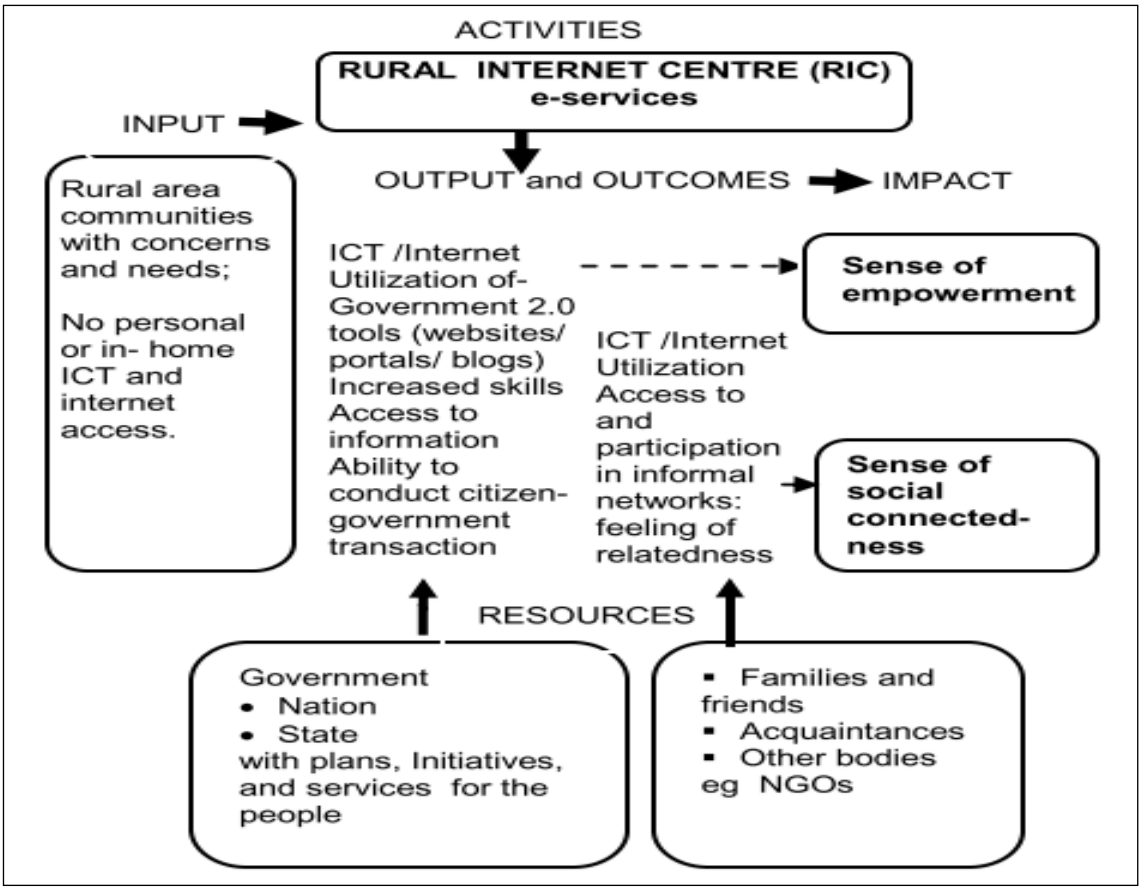

Figure 2.4 The General Framework of Change

Source: Alias et al. (2011)

In the rural setting, development theory suggests that economic development would be better if all three development factors were considered: technological advancement affecting the global economy, the organisational and behavioral consequences of the "New Growth Theory" for a better development strategy, and the speed of market reactions to those new economic development impetuses (Ward & Hite 1998). On the other hand, Galdeano-Gómez, Aznar-Sánchez and Pérez-Mesa (2011) espoused the idea of rural development not being extensively driven by the regional economic growth program but by the respective agrarian activities as well. Ngah (2015) has ascribed rural development

as a change process with the aim of improving the rural community's socio-economic situation.

For the successful implementation of the Rural Development Policy and Strategy, the programme would need to be driven by the Federal Government, the States, and the local municipal authorities (Ngah 2012a). Gangani, Dungrani, and Jadeja (2018) also supported the crucial driver roles to be played by the government, its relevant state agencies, and local authorities. They also espoused the need to engage the local community to be highly involved in the rural development programme for their respective rural communities. A local community council, led by the respective elders and appointed individuals in the rural community, should participate in all decision-making and rural development programmes for their respective villages (Gangani, Dungrani, & Jadeja 2018). These local village councils should also be given the empowerment to govern their respective villages.

New and innovative methods of developing rural areas were introduced and established under the concept of smart rural development (Garner 2019; Aziiza & Susanto 2020; Indira & Anupama 2016). This would suggest new ways and methods of revitalising and redeveloping the rural areas through smart partnerships with the local vendors and partners. Erdiaw-Kwasie and Alam (2016) advocated the idea of having rural partnerships with the local rural partners towards establishing a new development agenda with an inclination towards new innovative technological services.

They indicated only the local rural community would understand the local needs of the villages and, hence, would be better able to design their own services. The government and its relevant agencies would come up with the required supporting policies as well as

the funding to facilitate the new rural development program. The rural partnership would facilitate the integration of diverse public and private resources into an innovative alliance to strengthen rural communities and improve rural lifestyles (Erdiaw-Kwasie & Alam 2016). Soto (2019) also further supported the notion with the advent of high-speed internet connectivity, made available through strong government driving policies and subsequent funding.

Wolski (2019) suggested smart villages as an approach under the rural economic development programme for the rural European Union. Wolski and Wójcik (2019) define smart rural development as an innovative specialised rural development strategy that incorporates the concept of "embeddedness, relatedness, and connectivity. "Embeddedness and relatedness would correlate to the rural communities' with their local surroundings, whereas connectivity denotes the availability of modern technology, which would be digital internet connectivity.

Fahmi and Sari (2020) from their study on rural development programmes through the new digitalisation and information technologies have also proven the overall improvement in the socio-economic well-being of the affected rural residents understudied. This was especially true with those respondents having direct involvement and participation in the new rural development program. Therefore, smart rural development would need to be applied with respect to a locality-based approach (Zavratnik, Kos, & Stojmenova 2018).

2.2.4 The National Agenda: The New Rural Development Framework Policy 2030

The new Malaysian National Agenda, formulated under the New Rural Development Framework Policy 2030, was to drive Digital Adoption Behavior to reduce the Digital Divide and to improve the economic and socio-economic well-being of the rural communities through Digital Economy enablement (Book on Malaysian Rural Development Framework 2019). The Malaysian Smart Village Program would be one of these new initiatives. Currently, the ministry is looking after a total of 191 rural community centres (*Pusat Komuniti Desa – PKD*). The functionality of the rural community centre was shown in Figure 2.5.

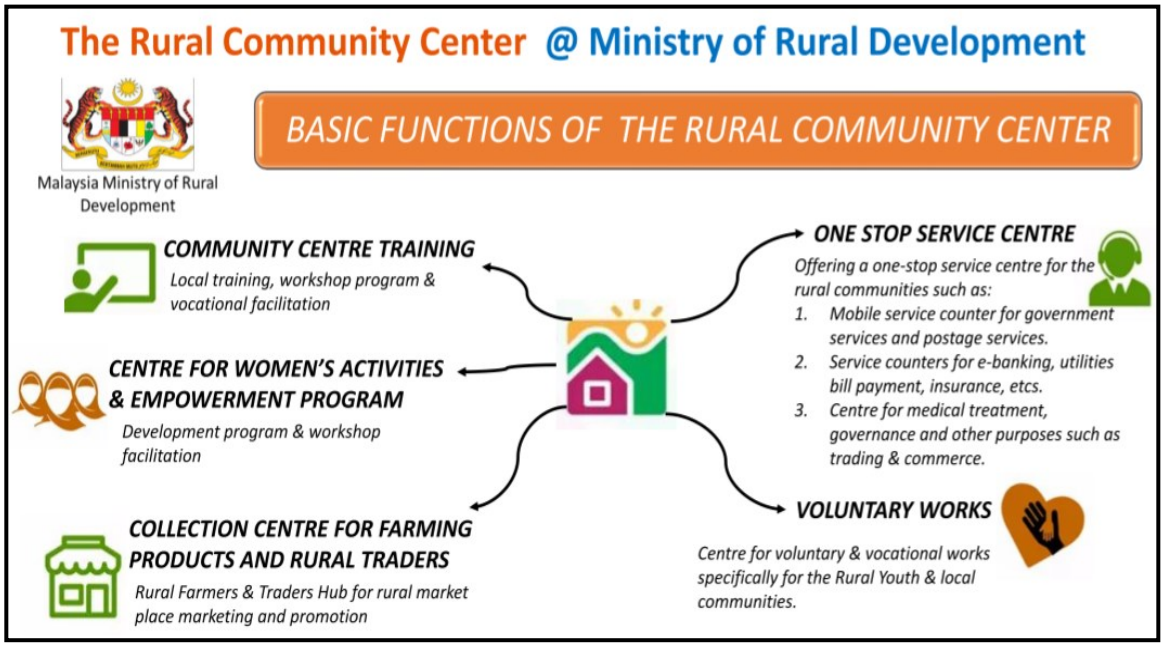

Figure 2.5 The Current Functional Rural Community Centre under the Malaysian Ministry of Rural Development

Source: Shahriar et al. (2014a)

The centre served as the rural community centre for the rural folks to plan and run some community and social programs. At the same time, the Malaysian Communication and Multimedia Commission under the Ministry of Communication and Multimedia was also looking after a total of about 435 rural Malaysian Internet Centres (*Pusat Internet Malaysia – PIM*), with a similar scope of work, albeit with some additional functions such as the rural library and the rural internet café. The Ministry of Communication and Multimedia, through its agency, the Malaysian Communication and Multimedia Commissions, possessed the much sought-after development fund from the Universal Service Fund. This fund is obtained yearly from all the telecommunication service providers in the country.

All these secluded rural transformation programs and initiatives should be consolidated under one rightful ministry, the Rural Development Ministry, hence the advent of the Smart Village Program, spearheaded personally by its then minister, Dato Seri Rina Haron. The minister, Datuk Seri Rina Mohd Harun, had personally written to Telekom Malaysia Berhad on the needs of high speed bandwidth digital connectivity requirements to serve the rural community centres, resulting in many subsequent high-level management meetings between her and Telekom Malaysia's top management. These high-level meetings between the ministry and the national telco would continue even with the change of the government in the year 2020, as the need to empower the rural communities with the rural digital economy superseded other interests.

2.3 Rural Digital Hub

SARKAR (2018) posited the notion of having a rural hub or centre as a catalyst for the development of the rural region. This was because of the spatial distances between the rural households, which necessitated a hub or service centre for the rural communities to get together for their trading and commerce activities (Grimes 2003). Moura and Pinheiro (2009) further espoused the need for a rural tele-centre to provide free internet connections for those who could not afford them as a means to promote rural digital inclusion.

A Rural Community Centre or Hub would be a gathering place for rural residents to meet for daily commerce and governance services (Shahriar et al. 2014b; Ngah 2012a). Alias et al. (2011) further theorised on the need for such rural internet centres to provide rural folks a sense of social connectedness and relatedness, which would promote social empowerment for the rural community (Alias et al. 2011a; SARKAR 2018; Chigbu 2013).

The Digital Hub was defined as a physical space located alongside a community, complete with facilities and access to high-speed broadband internet connectivity, with the aim of providing digital services for the community (Ashmore, Price, & Deville 2019). The hub would serve to promote commerce and trading activities for the community and would provide all the required digital connectivity and platform, while promoting the propagation of digital technologies and services, improving the digital literacy of the said community (Ashmore, Price, & Deville 2019).

Similarly, for a Rural Digital Hub, the proposition would be the same but with strong emphasis on rural digital services for the rural communities (ENRD 2017a; European Union 2018). In addition, as the rural communities would have poor digital

literacy due to the prolonged rural digital divide and economic exclusion, the conception of a rural digital hub would not only serve as a hub for trading and commerce activities, but would also serve as a one-stop-centre for training, programme awareness, governance, and financial services (SARKAR 2018; Moura & Pinheiro 2009; Department of Digital, Culture, Media, & Sport 2019; ASHOK & UGC-JRF 2018).

The Rural Community Centre would be the focal point for all rural business and community activities (SARKAR 2018; ENRD 2020). It should also serve as a catalyst for rural regional development (SARKAR 2018; Marshall & Taylor 2007; Ngah 2009). It should also serve as a change or transformation agent for the rural community in improving the rural socio-economic situation (Alias et al. 2011a). With the advent of amazingly fast internet connectivity, the Rural Digital Hubs would provide benefits to the rural communities on a few aspects. By referring to ENRD (2019), Stenberg, Morehart and Cromartie (2009) and Philip et al. (2015), the Rural Digital Hubs provide the opportunities for smart public-private-partnership for rural digital services serving the communities.

Besides, it also opens new business opportunities and could potentially create new jobs, especially for young rural folks. These scholars also highlighted that the Rural Digital Hubs assist in improving rural people's digital literacy and creating new needs and higher demand for digital services catering to their needs. Not only that, but the hub would also function as a community centre for training and development, as well as for propagating rural trading and commerce activities. It would strengthen communities and improve communication. The promotion of rural socio-economic rejuvenation and a rural digital economy can also be implemented by these hubs.

Ashmore and Price (2019) have categorised several typical rural digital hubs already deployed throughout the rural European Union, as shown in Appendix 14. Basically, the hubs could be categorised as providing a mere public internet access point, an incubator or working space, a training center, or a centre catering to some specific needs for the community, such as for rural youth or rural housewives. They also conducted a targeted digital hub survey to determine the common themes of operational functions for the rural digital hubs across Europe, as summarised in Appendix 15.

On a scale of 1 to 5, with 1 being the least disagreeable and 5 being the most agreeable, Internet Access Delivery was ranked first, followed by Meeting and Networking Place, Improvement of Digital Skills, Attract New Businesses/ Residents/ Visitors, Fostering Business and Community Development, and Promoting Broadband Infrastructure Improvement (Ashmore & Price 2019). These findings were greatly supported by others on the needs of having a hub for meeting places and for community programmes and development, as well as for improving digital literacy (ENRD 2017a; Department of Digital, Culture, Media, & Sport 2019; Wolski 2019; Real, Bertot, & Jaeger 2014).

2.4 Rural Digital Inclusion

Real, Bertot and Jaeger (2014) explain that digital inclusion is an important concept to understand to ensure an individual's capacity and capability to access digital technologies in order to use them and to learn to use them (Real, Bertot & Jaeger 2014). As such, in the rural context, digital inclusion would require policies and strategies to alleviate the interrelated issues of the rural digital divide and rural digital literacy (Moura & Pinheiro 2009; Real, Bertot, & Jaeger 2014).

Hamdoun et al. (2016) espoused the growing socio-economic gap contributed by those rural communities who were disconnected and digitally excluded. Chernova, Zobov, and Starostin (2019) supported his position further in their study on digital inequalities in Russia, which heavily impacted rural communities due to poor digital and internet access and access to information and communication technologies (ICT).

Moura and Pinheiro (2009) would also find a similar paradox in Brazil, where poor digital infrastructure has resulted in those rural communities being excluded from the mainstream of those residing in urban areas. Similar arguments and findings from many others put forth the definition of rural digital inclusion as the capacity and capability of rural communities to access ICT or digital technologies in order to use them and the ability of the rural community to learn how to use them (McCauley 2017; Correa & Pavez 2016).

Rural Digital Exclusion would suggest the opposite, that the rural community would be digitally disconnected from the mainstream and hence be excluded from many potential opportunities that could otherwise be available to them. Helsper et al. (2008) put forth the proposition that digital and social exclusion are directly correlated with each other. A high

level of digital engagement would directly promote social inclusion. A digitally disconnected society would result in the said society being excluded and disengaged, as shown in Figure 2.6 (Helsper et al. 2008).

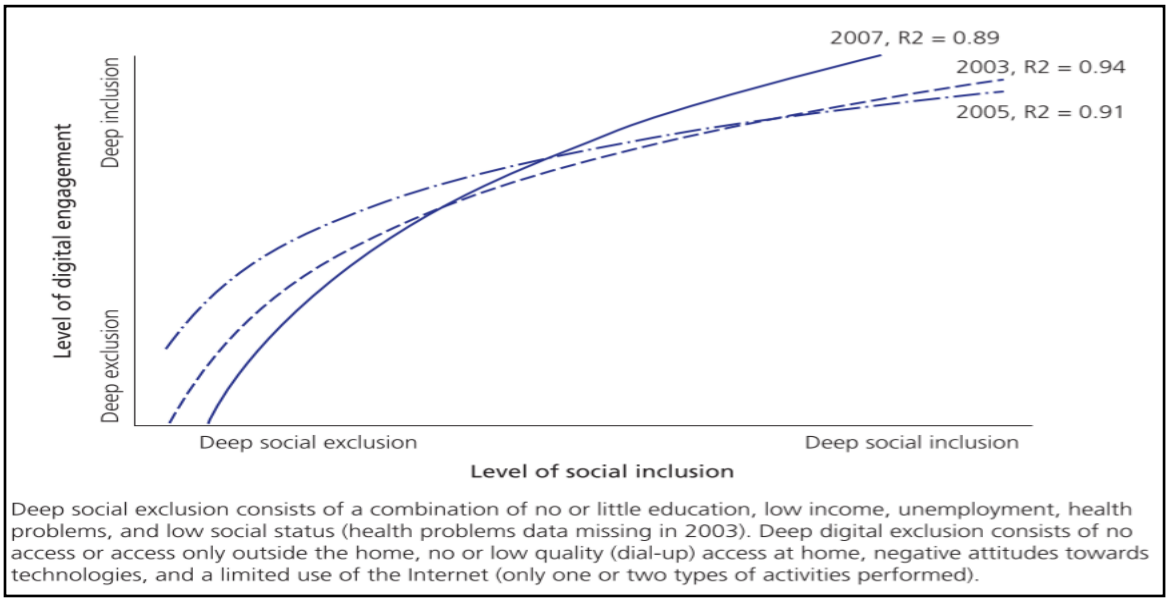

Figure 2.6 A Correlation between Level of Digital Engagement and Social Inclusion
Source: Helsper et al. (2008)

Freeman and Park (2015) would posit that the only way to promote rural digital inclusion would be to improve internet access and for the government to come up with a national digital agenda to address this. However, having good internet access and digital platforms was only half of the solution to rural digital exclusion (Wolski 2019; Roberts et al. 2017a; Salemink, Strijker, & Bosworth 2017a; Ramakrishna 2018).

Heeley and Damodaran (2009) espoused the Digital Inclusion Theory, which proposes that the community not only fully embrace digital technology, but also be empowered. The community ought to determine and co-create the relevant and required digital services to be used in their rural locality context. This proposition was also supported by the European Network for Rural Development in their reports and findings on Smart Villages deployment throughout some rural areas of the European Union countries (ENRD 2020, 2017a).

Roberts et al. (2017) also supported this proposition and further suggested that this empowerment would serve as a form of rural community resilience in adapting to the new digital or ICT technology enablement for the betterment of rural communities. Heeley and Damodaran's (2009) Digital Inclusion Theory proposed a hierarchical framework for the evolution of digital inclusion, quite like the well-known Maslow's theory of hierarchical needs, which comprises of five levels.

At the first level, which is Digital Infra Connectivity, both technical and physical infrastructure are the underlying vital components for inclusion that provide access to digital and ICT technology and services. Next, Digital campaign awareness and Digital Literacy, at the second and third levels, communicate about ICT and digital awareness that assist in increasing user numbers and conduct the training development programme that aims to increase ICT and digital literacy among the users to sustain usage. At the fourth level, which is digital opportunity, promoted the participation in the development of content and digital services for relevance and long-term usage. The Digital Empowerment, at the fifth level, encourages the users' co-creation of digital content and applications that enable them to tailor technology and services to the specific needs of the rural community based

on their locality requirements.

All five levels would serve as the determinant factors to stimulate rural digital inclusion and promote sustainable usage for the betterment of the rural socio-economic situation (Heeley & Damodaran 2009; Smith 2015). On the other hand, Marin and Prodnik (2014) further espoused the idea of social, political, and economic aspects of rural digital inclusion, focusing on the crucial prerequisites of increasing rural digital inclusion with respect to political will and social and economic needs.

The more remote the communities were, the more likely they were to be disconnected and excluded due to the high cost of the infra connectivity and the inability of the communities to own and gain access to digital or ICT devices (Marin & Prodnik 2014; Ferreira 2019; Smith 2015; Haenssgen 2018). Both Ferreira (2019) and Smith (2015) were strong proponents of a full review and deployment of strategic government policy in rolling out a national digital agenda to improve rural digital inclusion and reduce the rural digital divide.

2.5 Rural Digital Divide

Digital inequalities happen when adoption and use of digital technology or ICT is not provided for some members of the community, either for demographical and geographical reasons, or for social, economic, and political reasons (Alam & Salahuddin 2015; Philip & Williams 2019; Ponge 2016; Pavez, Correa, & Contreras 2017; Chernova, Zobov, & Starostin 2019). In the modern era of convergence, no access or no usage would result in total isolation and exclusion from the digital mainstream, commonly associated with the term "digital divide" (Hindman 2000).

It is not an exaggeration to assume that those in rural and remote areas will suffer the most from a lack of access to and use of digital technology and the internet due to the high cost of infra for rural digital connectivity (Hindman 2000; Feldmann 2018; Wang 2013a). As a result, the Rural Digital Divide would be defined as the ever-increasing gap between those in rural communities who have access to and use of digital and ICT technology (Hindman 2000). Philip et al. (2017) further espoused the inability to gain access and usage of internet access as the main contributors to the rural digital divide. Venkatesh and Sykes (2013) posited the digital divide as an economic and social issue resulting from the gap between those communities having and not having access to and usage of digital and information communication technologies.

These divisions would cut across a wide demographic, ethnic, and geographic spectrum, with the rural and remote areas bearing the brunt of the brunt (Venkatesh & Sykes 2013; Tengku Feissal 2005; Bansode & Patil 2011). Ponge (2016) also advocated for the gender digital divide, claiming that women are more vulnerable to it than men, but

this study would be focusing on the rural digital divide, inadvertently including women in rural communities. The advent of globalisation and the industry 4.0 digital revolution would serve to amplify the rural digital divide, as rural communities would be further left behind and disconnected from the digital mainstream, owing to socioeconomic factors as well as the high cost of installing the necessary infra (World Bank 2016b; Prado 2009; McCauley 2017).

Based on their study of households' perception towards the internet and digital information and communication technology (ICT) in the western downs' region of Queensland, Australia, Alam and Salahuddin (2015) have proposed the following determinant factors which contribute to the rural digital divide. The study was conducted on a total of 2000 household addresses randomly selected, of which 410 responded. It was found that digital divides persisted with respect to age, income, and education level. In addition, digital literacy also plays a crucial role in contributing to the digital divide (Alam & Salahuddin 2015). Chen (2003) further posited that the digital divide would be more prominent in remote and rural areas, making geographical location a crucial critical factor contributing to the rural digital divide.

Due to the high cost but low return on investment, the rural remotest areas would pose the greatest challenge to providing internet and digital connectivity, resulting in the private telecommunications sector avoiding investing in digital infrastructure (Ellis 2012; Moura & Pinheiro 2009; Salemink, Strijker, & Bosworth 2017b; Haenssgen 2018). The greatest paradox has resulted in the rural digital divide becoming more prevalent in areas where communities require the most connectivity, engagement, and inclusion (Haenssgen 2018; Correa & Pavez 2016; Moura & Pinheiro 2009). In addition, evidence from the

literature further suggested that a persistent rural digital divide would hamper economic development in the rural areas, further penalising the rural communities from making much-needed socio-economic progression.

Henceforth, it would be in the government's vested interest to formulate a national digital agenda to address the issues of the rural digital divide for the socio-economic betterment of the rural communities (Alam & Salahuddin 2015; Grimes 2003; Stenberg, Morehart & Cromartie 2009; Philip et al. 2015).

2.6 Rural Digital Economy

The term "Rural Digital Economy" was coined to describe the impact of digital technology on the socioeconomic aspects of rural communities (Philip et al. 2015). The Rural Digital Economy was also known as the New Rural Development Program, with the aim of improving the socio-economic status of the rural community (Li 2017b; Salemink, Strijker & Bosworth 2017a; Marshall & Taylor 2007).

2.6.1 Definition of Rural Digital Economy and Its Improvement Program

The "digital economy" denotes those business and commerce activities undertaken by the public and private sectors in co-creating, embracing, and innovating digital technologies and services to improve their socio-economic tasks by enhancing productivity, lifestyle, and prosperity (MDEC 2019). The massive interconnectivity of people, organizations, and devices enabled by the Internet, Mobile Technology, and the Internet of Things (IoT) would be the backbone of the digital economy. The digital economy would change the way businesses are structured, how companies and organisations interact, and how consumers acquire services and information and purchase goods.

In addition, the digital economy would also refer to a whole range of economic activities and transactions that adopt digitalized information as key features of the supply value chain. This would include the internet, cloud computing, big data, and other such new digital technologies that would be applied for collecting, storing, analysing, and disseminating information digitally (MDEC 2019).

These digital transformations would catalyse the advent of the digitalization of the economy, which would drive wealth creation, job opportunities, and subsequent economic growth (Record et al. 2018; Vineles 2018). The propagation of the digital economy would also transform the way people interact with each other as well as bring about drastic sociological changes for the betterment of communities (Bank 2018).

As a result, all of the precursors to the successful digitalization of smart services for smart communities and smart cities were brought into the context of rurality to improve the socio-economic and lifestyles of the communities residing there (Visvizi & Lytras 2018; Viswanadham 2011). However, for this to be achieved, one of the crucial precursors for the successful deployment of the digital economy would be digital internet connectivity (European Union 2018). Because of the lack of digital connectivity, the rural digital divide had to be addressed first before the economic exclusion of rural communities could be eliminated (Philip et al. 2017a; Chen 2003; Hindman 2000).

In other words, to catalyse the rural digital economy, the issues of rural digital divide and economic exclusion would need to be addressed and resolved simultaneously (Phillip et al. 2017a; Haenssgen 2018; Grimes 2003). This is where the introduction of Rural Community Centres (RCCs) with high-speed fibre connectivity should help to promote the rural digital economy, as these RCCs would aid in addressing issues of digital divide and exclusion for rural communities (Pavez, Correa, & Contreras 2017; Michailidis, Partalidou, & Papadaki 2010; Shahriar et al. 2014a; Alias et al. 2011a).

2.6.2 Antecedents of Rural Digital Economy Improvement

The pre-test conducted at the Proof of Concept (POC) site at one of the rural community centres at Pagoh revealed seven issues plaguing the rural communities. The following sections discuss these issues.

2.6.2.1 Digital Connectivity

Digital connectivity is important for the rural digital economy's improvement. Digital connectivity's definition is hotly contested. The socio-technological spectrum is represented by these definitions. It might be characterised, for instance, as relationships made possible by digital media technologies or as the deployment and quality of broadband infrastructure (Ponzanesi, 2019; Digital Economy & Skills Unit, 2018). Both definitions are overly restrictive in many ways. In contrast to the latter, which only emphasises broadband connectivity, the former prohibits the use of technology other than digital media. Digital connectedness must be considered as a component of a larger digital ecosystem rather than being isolated, as the phrase suggests. It must support a variety of use cases and contexts as well as an ever-evolving technological foundation.

When discussing digital connectedness, policy overwhelmingly places a first-world and macro bias on the development and quality of telecommunications infrastructure, particularly broadband. It starts off by assuming a constant power source. The bulk of those without access to electricity are found in rural areas, particularly in Asia and sub-Saharan Africa, and number over 770 million people (IEA, 2020). Without energy, the Internet is a "black hole," as one observer put it (Rubin, 2017). Second, it presumes that when

telecommunications infrastructure has been installed, people and other social institutions will have access to computing devices and the know-how necessary to operate this telecommunications infrastructure. It is incorrect to assume this. Finally, it presumes that access to the Internet is unrestricted. Access to the Internet may be restricted by the government generally or in particular situations, in addition to the digital divide's disparities.

Rural digital hubs have been suggested as a potential option to boost broadband access, raise levels of digital literacy among people and among enterprises, draw in new residents and tourists, and boost economic activity. A rural digital hub is described by Rundel, Salemink and Strijker (2018) on p. 1 as "a physical location, which can be fixed or mobile, focusing on digital connectivity, digital skill development, and/or emerging technologies." They are not a novel concept. They merely encapsulate the most recent surge of optimism for what were known as telecottages in the 1990s and telecenters in the 2000s (Moriset, 2011). During the COVID-19 epidemic, they are being used more and more in legislative solutions to help remote workers. Rural digital hubs and co-working spaces have more hope for the industry because of state and corporate support for remote work (Tomaz et al., 2021).

According to Rundel et al. (2020), these hubs can be divided into hubs for communities, hubs for businesses, and hubs for both of these groups of stakeholders. Similar to that, they could be independent or housed together in community centres or libraries (Rundel et al., 2020). Additionally, they point out that while the ENRD (2017) intended for rural digital hubs to actively contribute to enhancing digital literacy, in practise, few did so or even acknowledge themselves as such, and when they did, the

services demanded money (Rundel et al., 2020). As a result, accessibility problems might not be resolved adequately. Committed leaders and community involvement are essential components of the rural digital hubs initiative's success, and rural digital hubs should be a part of a town's larger strategic plan. Important to keep in mind is that the creation and maintenance of such hubs requires a combination of support from local, state, and federal agencies, as well as the corporate sector through sponsorship.

Numerous measuring difficulties are spawned by the manner in which digital connectedness influences economic outcomes. As Canzian et al. (2019) highlight, digital connection is best characterised as a "universal purpose technology"; as such, its positive impact on economic outcomes most likely consists of growth-enhancing externalities that improve all economic activity and social interactions. Abrardi and Cambini (2019) note, however, that empirical quantification of these externalities has been hard because it tries to measure the effects of the spread of high-speed broadband using economic metrics instead of network effects.

2.6.2.2 High Cost of Infra and Connectivity

However, having high-speed internet and digital connectivity would incur a tremendous high cost due to the geographical remoteness of most of the locations of the RCCs (Haenssgen 2018; Plucha 2019; Chiaraviglio et al. 2016). Furthermore, the economics of scale would make it impossible for any telco to deploy high-speed internet connectivity to the rural (Ellis 2012; SARKAR 2018; Hamdoun et al. 2016; ENRD 2020). Unless the cost of providing rural digital internet, connectivity was brought down to an acceptable level, the enablement of the rural digital hub at the RCCs to stimulate the rural digital economy would not happen (ENRD 2020; Moura & Pinheiro 2009).

For the cost to be lowered and shared equally, a national broadband agenda to facilitate the Universal Service Provisioning among the telcos and the Private-Public Partnership programme needs to be undertaken and driven by the government (Hanafiah 2016; Malaymail 2020; Philip et al. 2017b; Adamowicz 2018; Brake 2017).

2.6.2.3 No Relevant Digital Contents and Applications

To maintain and sustain digital economy usage in rural communities, relevant digital content, applications, and smart services must be co-created and embraced by the end-user (Pretorius & Sangham 2015; European Union 2018). Only then would the digital transformation for the intended rural communities take place (Hoque & Sorwar 2015; Information Services in Rural China, an Updated Case Study 2012; Plucha 2019). Successful digital enablement for e-commerce activities in China and Indonesia clearly demonstrates the need to have relevant digital content and applications for mass usage in

the intended rural communities (Oreglia, Liu & Zhao 2011; Li 2017a; Alibaba Group 2016; Fahmi & Sari 2020; Kamarudin, Untari & Ngah 2018).

To help sustain the usage, it would be paramount for the intended users, the rural entrepreneurs and traders, to come on-board and embrace the digital technology and platform, and to also participate in the co-creation of the smart services and the digital content needed. This would serve to make it easier for them to market their products to the mainstream via the on-line rural digital marketplace (Kamarudin, Untari, & Ngah 2018; Tanvig et al. 2018; Jaganathan et al. 2018).

2.6.2.4 Digital Literacy

According to List (2019), there are three basic notions that are used to describe digital literacy the most. The idea that "digital natives" are students who are born with a natural capacity to use technology was first put forth by Prensky (2001). He uses the term "digital natives," which he coined, to describe all of today's kids as being fluent in the digital language of computers, video games, and the Internet. The younger generations of millennia, who are digital novices, typically don't understand the new skills that older generations have developed and perfected over years of contact and practise.

In reality, younger generations of the digital era have been found to lack the necessary skills for critically evaluating internet usage and technology exposure is uneven over a wide range of socio-demographic categories, greatly contributing to a "digital gap" (Hargittai & Jennrich 2016). However, the earlier literature raises the hypothesis that kids are digital natives who acquire technology abilities through diffusion (Jones & Czerniewicz

2010; Oblinger & Oblinger 2005). Wang et al. (2013), who created a model of digital fluency, say that digital literacy is a result of many things, such as demographic characteristics, psychological characteristics, social consequences, and technological aptitude.

The second concept is that, according to one of the most widely accepted definitions of the term today, "digital literacy" is a collection of connected skills or talents necessary for surviving in the digital era (List 2019). Gilster (1997) coined the term "digital literacy," which he described as the capacity to understand and use digital content given on computers in a variety of formats from a wide range of sources. He went on to say that acquiring a number of core skills is necessary for being digitally literate and using internet information. However, Bawden (2001; 2008) identifies them as skill sets related to reading and understanding multimedia and interactive texts, putting information together, sharing information with others, as well as locating and critically evaluating information from digital sources. Gilster hasn't said what skills might be needed to develop digital literacy.

Since Gilster (1997) first put forth his competency-based notion, other models and ontologies have helped us comprehend the skills that kids would need in the internet age. Reproduction literacy, information literacy, photo-visual literacy, socio-emotional literacy, and branching literacy are the five literacies that Eshet-Alkalai (2004) defined as the core components of digital literacy. Reproduction literacy refers to a student's capacity for synthesising thought, or the capacity to create novel ideas from pre-existing knowledge. Information literacy describes the abilities required to assess online content critically. The ability to understand and create symbols other than words, which is necessary for communication in the digital age, is known as "photo-visual literacy." Online

communication and collaboration skills are related to socio-emotional literacy. Last but not least, branching literacy refers to a student's ability to understand the differences between hypertexts and multimedia sources that represent information on the Internet (List 2019).

The majority of the competencies covered by common definitions of digital literacy as well as pertinent terms like new media literacy, 21st-century skills, information literacy, and others were examined by Van Laar et al. (2017). He found that the relevant components of digital literacy are composed of five contextual skills and seven fundamental skills after reviewing 75 studies. People think that fundamental or core skills are useful or necessary for doing things, while contextual skills are more strategic or help people use their core skills.

Problem-solving, information management, critical thinking, teamwork, technical communication, and creativity are the seven elements that make up the fundamental competencies. Self-direction, flexibility, ethical awareness, lifelong learning, and cultural awareness comprise the five components of contextual skills, whereas Regarding the characteristics of digital literacy, Van Laar et al. (2017) place particular emphasis on crucial competencies related to the application of technology, such as technical skills, as well as cognitive skills like critical thinking, information management, and problem solving, as well as socio-emotional skills like cultural awareness and teamwork (List 2019).

The sociocultural perspective on digital literacy is the third concept that academics are actively debating. Sociocultural perspectives place a strong focus on the literacy components of digital literacy and, as a result, see students' active participation in a variety of online communities as indicators of their level of digital literacy. Knobel and Lankshear (2006) say that a sociocultural perspective on digital literacy means that students use

encoded texts to take part in socially established ways of making, exchanging, and negotiating relevant content as participants in stories.

2.6.2.5 Demographic and Geographical Issues

As previously stated, the demographics of rural households would be a critical factor in the successful implementation of the rural digital economy. The consequences of social economic exclusion caused by the rural digital divide would also obstruct the path for rural communities to socioeconomic improvement; households would not be able to improve their livelihoods because the means to improve them were beyond their capabilities. This is referred to as the rural paradox or the rural penalties; the digital technology and platforms identified to help rural people were also contributing to their exclusion from the mainstream (Salemink, Strijker, & Bosworth 2017a).

Furthermore, due to the remoteness of most rural areas, the challenges of bringing rural digital economy enablement to the rural population would be inadvertently and dramatically exacerbated (Grimes 2003). These issues must be addressed effectively to ensure the successful integration and transformation of rural communities to embrace the new rural digital economy program enablement.

2.6.2.6 Socio-Economic Issues

The implementation of the digital transformation process in economic and industrial systems, which is growing in importance, is one example of a specialised component that economists have recently started to place a larger value on (Ha 2022a, b; Ha & Thanh 2022). Today, the micro- and macroeconomic levels of corporate operations have substantially improved thanks to digital innovation and technology progress (Reuschke & Mason 2020). Khan, Khan, and Aftab (2015) say that the methods of the industrial revolution have had a big impact on working culture, international relations, and the growth of the economy, as well as on the structure of technology's impact.

In order to increase the efficiency of social production, the digital economy, according to Jehangir et al. (2011), consists of high-level, innovative technologies and products that are predominantly digital. The level of company operations in the economy will undoubtedly change as a result of digital innovation. Information and communications technology (ICT) has grown significantly as a result of digital technology, and ICT has enabled efficient economic networking and communication (Khan, Khan, & Aftab 2015; Park & Choi 2019). In order to maximise output, a smooth facilitation procedure between businesses is therefore made possible.

A digital economy also has a significant impact on the quality of social life, job creation, and education in addition to the recognition of successful and efficient corporate processes through digitization (Pradhan et al. 2019; Reuschke & Mason 2020). Recent years have seen the widespread adoption of digital innovations and services by consumers, enterprises, corporations, and governments emerge as a key component of an economic

driver that maximises economic growth and promotes job creation (Chinoracky & Corejova 2019). Digitization has been crucial in aiding government initiatives that promote employment and economic development with the aim of promoting economic growth (Johnson 2019; Reuschke & Mason 2020). Global digitalization is not only changing social life, unlike job creation, but also how an economy is structured. Social life impact and digitization are closely related. As a result, the use of digital technology and innovation in the fields of education, business, transportation, security, and healthcare has unquestionably raised people's standards of living (Pradhan et al. 2019; Johnson 2019).

Malaysia has set out on a protracted journey from being a rapidly resource-driven economy to one that is knowledge-driven in the global digital economy. Through effective research and development, significant policies that have been put into place over time have strategically mapped out directions in the area of technology and innovation. In order to make the country into a cutting-edge digital economy, a number of initiatives have been started through research and development (Rashid et al. 2017; Turina 2020), with the goal of achieving a digital economy and transforming the nation into a developed economy. Initiatives to develop a digital economy in Malaysia are used to create appropriate IT infrastructure across all economic sectors (Halili & Sulaiman 2018; Johnson 2019). Investment in ICT infrastructure is still a top priority; promoting ICT acceptance and use in e-commerce, healthcare, business, and education is now essential to the advancement of human life (Turina 2020).

2.6.2.7 National Broadband Policy

To be successful, any programme in this manner has to be integrated as part of a national agenda or policy (Heeley & Damodaran 2009; World Economic Forum 2017; Approaches to National Digital Governance 2017). There are numerous ongoing examples around the world in which the country would have had its own national agenda and policy to oversee massive programmes enabling digital infrastructure and connectivity for the rural community.

For example, in Europe, the current smart village enablement programme arose from the European Union's national broadband program, which was implemented in a number of European Union countries (ENRD 2017b, 2019). The United Kingdom was also instrumental in developing a national broadband policy that served as the guiding principle for expanding broadband internet connectivity and coverage into the country's rural interior (Philip et al. 2015; Hossain et al. 2012; Fairhurst et al. 2012; PLUM Consulting 2019; Roberts et al. 2017b).

China was successful in its endeavour to improve the socio-economic conditions of its rural communities, and this was successfully attributed to the country’s national policy of facilitating digital connectivity expansion into the rural areas for its successful rural digital economic enablement programme (Information Services in Rural China, an Updated Case Study 2012; Alibaba Group 2016; Li 2017b; Xia 2018). India has developed its own version of smart village program enablement, which is entirely driven by the federal government (Viswanadham & Vedula 2010; Indira & Anupama 2016; Gangani, Dungrani, & Jadeja 2018).

The African continent, too, recognised the need for a coordinated national broadband policy to drive the transformation required for their rural communities (Mile, Serumaga, & Kizito n.d.; Madzima & Nhamu 2010; Ponge 2016; Jere 2011). In addition, the United States of America has long recognised the need for a national policy on opening up the telco industry to facilitate digital connectivity into the rural interiors of the continent (Salemink, Strijker & Bosworth 2017a; Bolton 2019; Real, Bertot & Jaeger 2014). Oceanian countries, such as Australia, have advocated a greater need to implement a national policy to ensure that all rural and remote areas of their vast continent are fully covered and connected (Freeman & Park 2015; Erdiaw-Kwasie & Alam 2016).

Malaysia has also come around in recognising the need for a national broadband agenda and a national digital agenda to be undertaken and rolled out nationwide, especially in the rural areas and communities (Hanafiah 2016; Ramanathan, King & Azizan 2020; Malaymail 2020; Russo & Cesarani 2017). The newly launched “JENDELA” Program, a Malay language abbreviation for the National Digital Infrastructure Plan that means "window" was intended to provide the country with a coordinated and integrated digital connectivity and platform masterplan to promote its national digital economy agenda (MCMC 2020a). The advent of the Covid-19 pandemic only serves to hasten and give credence to the programme and the importance of its being rolled out nationwide to cover the rural areas (Record et al. 2018; Heng 2020; World Bank Group 2018a).

2.6.3 Consequences of Rural Digital Economy Improvement

The reason for many countries' undertakings the national policy to institute a national broadband digital agenda was the perceived socio-economic improvement that would result in the uplifting of the nation's growth domestic products (GDPs) (World Bank Group 2018a; World Bank 2016a). Again, China served as a good example with its Taobao Village program, successfully generating wealth among the rural communities, which were notoriously poor during the seventies and eighties (Li 2017b; Alibaba Group 2016; Xia 2018; Yu 2018; Wahab 2019). At a much lower scale, it could also be seen locally that the rural development programmes undertaken by the Malaysian Ministry of Rural Development were successful in eradicating extreme poverty in the majority of the rural areas of Malaysia (Ngah 2009, 2015b).

However, there were instances of poverty still existing in the remote areas of the rural, which was mainly due to the lack of digital infra connectivity and, hence, no viable economic programme to provide sufficient wealth generation (School of Social Sciences, Universiti Sains Malaysia et al. 2018; Khazanah Research Institute 2018).

2.6.4 Measurements of Rural Digital Economy Improvement

Many articles and economic scholars agree that the true measure of a successful digital economic program would be national GDPs (Harvard Business Review 2020; Szenkman, Pilat, & Astarloa 2018; OECD 2014). Improvements in GDP would imply higher household consumer purchasing power, as would the extent to which all transactions are conducted via e-commerce (World Bank 2016a; OECD 2014; Szenkman, Pilat, & Astarloa 2018). For the scope of this study, it would be sufficient to incorporate the measurement of the numbers of rural entrepreneurs and traders who would participate in bringing their transactions digitally and how many of the rural folks would participate in the rural market place and conduct transactions via digital e-commerce (Abu-Assi, Al-Dmour & Al-Zu'bi 2014; Heng 2020; Stenberg, Morehart & Cromartie 2009; Valchovska et al. 2015).

2.7 Smart Village

Smart Village has had many interpretations and conceptions depending on which region it was developed in. Some explained the Smart Village concept using the Smart Cities proposition, which had a similar goal of improving the living conditions of communities, both rural and urban (Hindurao 2018). Some have espoused the idea of Smart Villages having linkages with Smart Cities and, hence, self-serving each other (Fennell et al. 2018). Some portrayed the Smart Village concept as being more focused on Smart Renewable Energy and Green Technology, serving rural communities off the grid (Heap 2015). There were those who ascribed the Smart Village conception more towards a Digital

Village proposition, providing digital rural services serving the rural communities (Atieno 2014; Alamanda et al. 2019; Phahlamohlaka et al. 2014).

2.7.1 Definition of Smart Village

Smart Villages for rural communities are being developed worldwide (Razak, Malik, & Saeed 2013). The concepts and interpretations varied depending on the rural locality requirements, but smart villages were generally an aggregation of services and innovation for rural smart community lifestyles and socioeconomic wellbeing (Soto 2019; Zavratnik, Kos & Duh 2018; European Union 2018). The use of information and communication technology (ICT) for rural service innovation has been widely developed and reported in Europe, Indonesia, India, China, and the Americas (Wolski 2018a; Plucha 2019; Atieno 2014; Venkatesh & Sykes 2013; Phahlamohlaka et al. 2014).

Viswanadham (2011) might be the first person promoting the idea of a smart village as a holistic concept geared towards providing a bundle of services for the rural community and utilising local resources from the surroundings effectively and efficiently for day-to-day living and trading. Viswanadham (2011) has also proposed a smart village's basic eco-system, which includes smart resources, smart institutions, smart delivery services infrastructure, and a smart supply chain. Hindurao (2018) was looking at Smart Villages having Wi-Fi technology to provide service enablement for the rural communities.

Wolski (2018) has discussed extensively the concept and definitions of "smart village" from the European Union perspective. According to Wolski (2018), Smart Villages are a new initiative under the rural development strategy with a strong emphasis on the

rural locality, community involvement, co-creation, and adaptation to new requirements. Wolski (2018) further quoted the European Network for Rural Development (ENRD), a leading authority on rural development in the European Union, on a more elaborate definition of Smart Villages, which are the new rural development strategies.

One of the strategies is to use digital technology whenever applicable and relevant to address the new rural community requirements. Besides, it also looks beyond the boundary of the villages themselves, but at the surrounding nearby villages and cities/towns and how the linkages could be formed and co-created. Other than that, it also establishes collaboration and partnership between the crucial stakeholders, such as the local municipal authorities, government agencies, and the private sector with the local rural communities and the local business sectors/enterprises.

In the meantime, it also encourages each village and its rural communities to be independent and create their own version of the Smart Villages Model, to the best of their abilities and their local resources. Smart Villages would have their own eco-system which would deliver S.M.A.R.T services to the rural communities as depicted in Table 2.1. The S.M.A.R.T attributes in general were a consensus among all the definitions acquired from all parts of the world. Smart Village Services should be easy to use, innovative, resilient, and relevant to the needs of the locality. The Smart Villages Services should also be on an open digital platform for easier collaboration and co-development (Soto 2019).

Table 2.1

SMART Villages Attributes and Proposition

Abbreviation	Attributes	Description
S	Social, Skill, Simple	Easily learned by the Rural Communities
M	Moral, Methodical, Modern	Innovative Services for Rural Communities
A	Aware, Adaptive, Adjusting	Rural Communities Resilience in adopting
R	Responsive, Ready	Relevant to the Rural Communities
T	Techno-Savvy, Transparent	Open Digital Platform for collaboration

Source: Gangani, Dungrani and Jadeja (2018)

In short, the Smart Village Proposition ought to have simplified services, be socially relevant and easily learnt by the rural villages. It should provide modern and methodical, innovative solutions and services. The Smart Village Proposition should also be easily adapted and adopted by the rural villages. The technology deployed should be on an open digital platform to facilitate transparency and effective collaboration (Gangani, Dungrani & Jadeja 2018; Zavratnik, Kos & Duh 2018; Wolski & Wójcik 2019).

Heap (2015b), in his collection of essays regarding the Smart Village concept, added the idea of Smart Villages having Smart Renewal Energy as the crucial enablement component. And there were some parts of Smart Villages in Europe and India that incorporated Smart Renewal Green Energy as one of their critical Smart Village conception components (European Commission 2016; Atkočiūnienė & Vaznonienė 2019).

2.7.2 Components of Smart Village

Figure 2.6 shows the overall Smart Village Ecosystem Framework with its respective details on those smart components. For a rural development program to be called a smart village program, it would need to have all of these respective smart components' enablement (Viswanadham 2011; Indira & Anupama 2016; Gangani, Dungrani, & Jadeja 2018). Viswanadham (2011) espoused and coined the five STERM forces when submitting the proposed Smart Village Ecosystem Framework. According to Viswanadhan (2011), the five STERM forces would constitute the main components of the Smart Village Framework; STERM is an abbreviation for *Science, Technologies, Engineering, Regulations and Managements.* The term *Science* here dictated new innovation, with *Technology* as the digital or ICT enabler, *Engineering* as the methods and mechanism to enhance the service delivery, with *Regulations* and governance, to provide the necessary *Management* of the rural services (Viswanadham 2011; Syaodih 2018).

An ecosystem would comprise many cross-functional networks of small and medium enterprises in the rural areas, working in tandem with the rural farmers and communities at large, under the governance of the federal ministry and state agencies, and with the local municipal authorities. Each of which would leverage each other's local resources to enable supply chain management to enable the service delivery of rural products. A smart village ecosystem would use innovative new technology and digital ICT enablers to enable smart services for service delivery (Viswanadham & Vedula 2010). ICT for rural development would be the key critical factor in determining the successful planning and implementation of a smart village (Bhavita & Malek 2018).

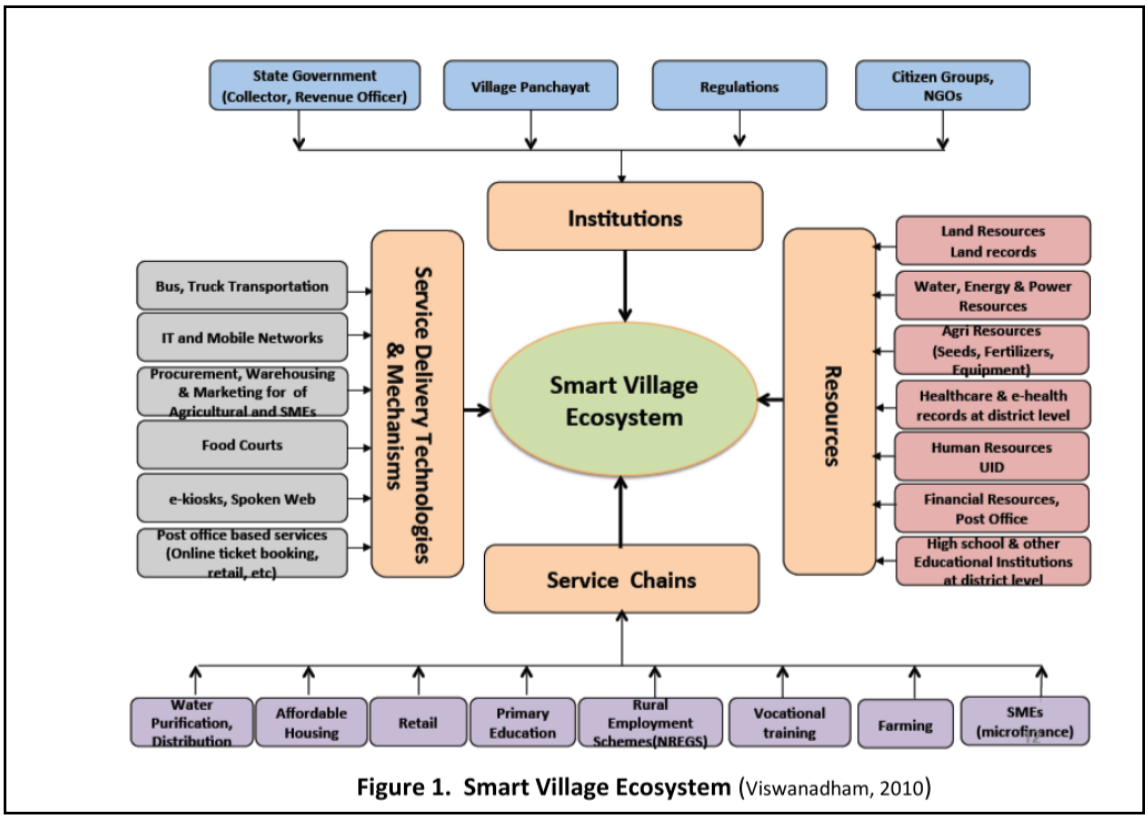

Figure 2.7 A Proposed Smart Village Ecosystem Framework

Source: Syaodih (2018) and Viswanadham (2011)

As such, the components of a smart village could be comprised of these smart components, such as smart infrastructure, smart technology innovation, smart service delivery, and smart institutions (Bhavita & Malek 2018; Kumar & RamaKrishna 2016). The internet and digital connectivity would be another important and critical component of smart village enablement. Many reports have been written about the need for rural internet and digital connectivity to serve as a catalyst for rural digital divide and socioeconomic inclusion (Feldmann 2018; Stenberg, Morehart, & Cromartie 2009; Kadir 2014; Brake 2017; Atkinson 2007).

Internet connectivity would not only provide digital access to rural communities, but would also enable the smart village framework's digitalized service chains and service delivery components (Viswanadham & Vedula 2010; Garner 2019; Soto 2019). The advent of 5G wireless technology would further advance the agenda for rural digital infrastructure development, as the technology would be adequate and adaptive to the needs of the rural community, especially in enabling the smart village concept (Chiaraviglio et al. 2016; PLUM Consulting 2019; Onireti et al. 2016).

2.7.3 Smart Village Proposition as the new Rural Economy Development Program

Serving the rural community, Internet connectivity would help to bring about the required rural development programme as it would serve to connect the rural communities to the online mainstream information media and various online services (Michailidis, Partalidou, & Papadaki 2010). Townsend et al. (2013) also highlighted broadband internet access as a potential solution to improve the socio-economic conditions of rural communities. Chigbu (2013) advocated for a new approach to rural development that would rely more on the internet via broadband access. Tanvig et al. (2018) and Li (2017a) propose that the new rural digital connectivity and rural e-commerce platform serve as the new agenda under rural development.

Yasin and Ngah (2011) have espoused the issues of limited rural business development prospects and stagnant rural development growth because of poor internet connectivity and infrastructural conditions compounded with low digital literacy. As such, rural entrepreneurs would not be able to bring their rural products into the urban areas or

outside due to poor demand from the lack of marketing and awareness caused by poor rural internet connectivity (Yasin & Ngah 2011; Michailidis, Partalidou & Papadaki 2010; Feldmann 2018).

Sometime in 2016, in a small rural country called Cork, Ireland, the European Union Rural Development held a conference. It came upon the Cork Declaration 2016, which stated the imperative of improving the rural living community to be on par with those in the city, with a strong emphasis on rural digital development for sustainability by strengthening the integration of the cities with their countryside, by spilling over the respective related smart cities equivalence services to the adjacent countryside, and by advancing the digitalization of services in the fields of transportation, communication, service delivery, and supply chain management systems (Adamowicz 2018; European Commission 2016). The Cork Declaration of 2016 would serve as the launching pad for the conception of the European Union Smart Villages agenda as the new rural development policy and mandates (Adamowicz 2018).

Additionally, in India, the Sansad Adarsh Gram Yojana (SAGY) rural development scheme was launched in 2014 by the Indian Prime Minister, Shri Narendra Modi (Tomar et al. 2019). This rural development framework proposed these rural development parameters as the measurement for smart villages, which were: infrastructure development, personal development, human development, basic amenities, social development, economic development, environmental development, and general awareness of governance (Tomar et al. 2019). In short, smart villages would be the new concept for rural development programmes as they would propose a more holistic programme for the betterment of the rural community (Marshall & Taylor 2007; Sai 2016; Garner 2019).

2.7.4 Empirical Evidence of Smart Village Program in other countries

There were many more examples of Smart Village programmes successfully deployed throughout the world. Because the Smart Village conception was locality-based, in other words, subjected to the rural locality's needs, the surroundings, and the availability of local resources, not all smart village programmes were similar to one another (Holmes 2017; Wolski 2018a; Viswanadham & Vedula 2010). However, all of them would basically share the same smart village ecosystem components as described in the previous sections.

There were many examples cited in the academic literature on Smart Villages' conception in India. The concept of Smart Villages was arguably started in India, with many case studies cited and the Smart Villages Framework Components developed there (Viswanadham 2011; Viswanadham & Vedula 2010). Hindurao (2018) advocated for a smart village with Wi-Fi connectivity in India to enable rural community services. Deshmukh, Satput and Rajebhosale (2018) advocated the idea of sustainable smart villages in India to be propagated by transformation agents such as the Non-Governmental Organizations (NGOs), Self-Help Voluntary Groups, and the local rural communities themselves, as well as supported by the public and private sectors under the Public Private Partnership (PPP) business model.

Rinkal et al. (2016), on the other hand, proposed the concept of "rurbanization" – urbanising rural areas – as another method of deploying smart villages in India. Prakash, Poul, and Nilesh (2017) advocated the use of Geographical Information Systems (GIS), Remote Sensing (RS), and Global Positioning System (GPS) in the design and development of Smart Villages.

As expected, the concept of Smart Villages differed from country to country in Europe, as it was heavily influenced by the needs and necessities of the respective countries and their local rural communities (Wolski 2018a). Lytras and Visvizi (2018), however, proposed reviewing the smart village concept as not only highly dependent on ICT and digital services but also looking at the ways and mechanisms to analyse the problems and prescribe solutions beyond the ICT-hypes. Hence, many examples of smart villages in Europe would not exemplify much in ICT or digital connectivity platforms or applications, but more on the services required by the rural communities, some of which are very conventional, as shown in Appendix 12.

Smart Villages were more concerned with how rural communities took matters into their own hands in order to find pragmatic solutions to their problems and capitalise on new opportunities (Holmes 2017; Kumar & RamaKrishna 2016). Digital solutions or smart services might or might not be part of the solutions, as smart would also mean the ability to advocate for new collaboration and partnership alliances, plotting their own sustainable socio-economic betterment (European Union 2018).

Four case studies of successful smart villages in Europe were: the "Inner Areas Strategy" in Italy, which corresponds to rural depopulation problems; the "Reciprocity Contracts" in France, which relate to the build-up of rural-urban linkages; the "Smart Countryside" initiative in Finland, which was to address depopulation and digital literacy; and the "Digital Villages" initiative in Germany, which was to harness the digital agenda for the rural community's smart services (European Union 2018).

On the other hand, China could be the success story of transforming sleeping poor rural communities into budding rural new business communities through the smart villages' digital enablement programme (Oreglia, Liu, & Zhao 2011; Li 2017a). "Rural vitalization" was a rural development strategy with the aim of transforming the poor, sleepy rural communities in China into a modernized rural economy thriving in producing and modernizing agricultural and rural areas (Xia 2018). Under such programs, those villages that were located adjacent to the nearby cities would benefit via rural-urban linkages. Development of the urban areas would also spill-over into the adjacent rural areas under the vertical integration strategy of the rural-urban supply chain management program. Those rural areas that were quite isolated would receive government support under the rural vitalization strategy to rejuvenate and modernize, with collective and active participation from the local rural communities themselves (Xia 2018; Zhang 2019).

Subsequently, e-commerce has increased by leaps and bounds in China, especially with the birth of Alibaba Group, which created the Taobao platform, an e-commerce platform that would become the largest e-commerce platform and business in the world (Yu 2018). With the introduction of "Taobao Villages", the government and Alibaba Group collaborated under Public-Private Partnership alliances to bring e-commerce to rural China (Li 2017a). This, combined with the heavy engagement of the Chinese mass populations in on-line purchasing and marketing, has resulted in the rejuvenation of the rural areas through the development of rural e-commerce (Alibaba Group 2016; Li, 2017b; Oreglia, Liu, & Zhao 2011).

As a result, in order to make e-commerce accessible to rural communities, internet and digital connectivity would be critical as an enabler to facilitate and catalyse rural economic growth and digital economy (Wahab 2019). Wahab (2019) strongly espoused that a 10% increase in broadband penetration would stimulate the economic growth of 1.38% of middle-income countries. He further concluded that China's successful Taobao Villages program and e-commerce digital economy program would propel China into becoming the new world economic leader (Wahab 2019).

He was strongly supported by Yu (2018), who further asserted that China would also be the world leader in digital productivity and innovation, beating the United States and the European Union nations (Yu 2018). Appendix 13 vividly showed China as being the leader in the digital economy compared to the rest of the world, namely the United States and the European Union.

2.7.5 The Underpinning Theory of Change behind the Smart Village Proposition

The word "change" meant a difference in stages, observed over some period. The father of change theory, Kurt Lewin, theorized on a three-stage model of change, which he called the "unfreezing-change-refreeze" model. For changes or transformations to happen, the process had to undergo these three phases, similar to a start-reset-restart mode (Lewin 1944). Social change, on the other hand, would mean observable differences in any social phenomenon over any period.

As such, social change would also mean community change and would constitute five theories of social change, which were: Evolutionary Theory, Cyclical Theory, Economic Theory of Social Change, Conflict Theory, and Technological Theory (Mayne 2015). Under technological theory, social changes were actually being facilitated by the new technological trending as well as other reasons, such as the Covid-19 Pandemic, which would necessitate new technological transformations to transform the community and society's lifestyles (Ion, Doina, & Sebastian 2012).

Shapiro (2006) proposed a change theory that relies on individuals' interactions with one another to catalyse social systemic change. As such, with regards to information and communication technology (ICT), as posited under the Technological Social Change Theory, the availability of a rural internet centre with sufficient ICT connectivity and facilities would stimulate the social changes and transformation intended for the rural communities (Alias et al. 2011a). The conception of such a Rural Internet Centre (RIC) would further promote the continuous improvement process of developing the RIC, amplify the impact of its inception on the related rural communities, and make the RIC better.

Figure 2.8 illustrates the general framework under the Theory of Social Change, constructed for the Rural Internet Centre serving the rural communities (Alias et al. 2011a). Ideally, the Theory of Change would serve as the underlying theory in supporting the Smart Village Program's ability to affect socioeconomic change or transformation betterment of the rural communities understudied by promoting social connectedness and relatedness, two critical factors in propagating rural social inclusion and rural digital dividends. For this study, the adopted theory of change approach by Alias et al. (2011) would be adopted.

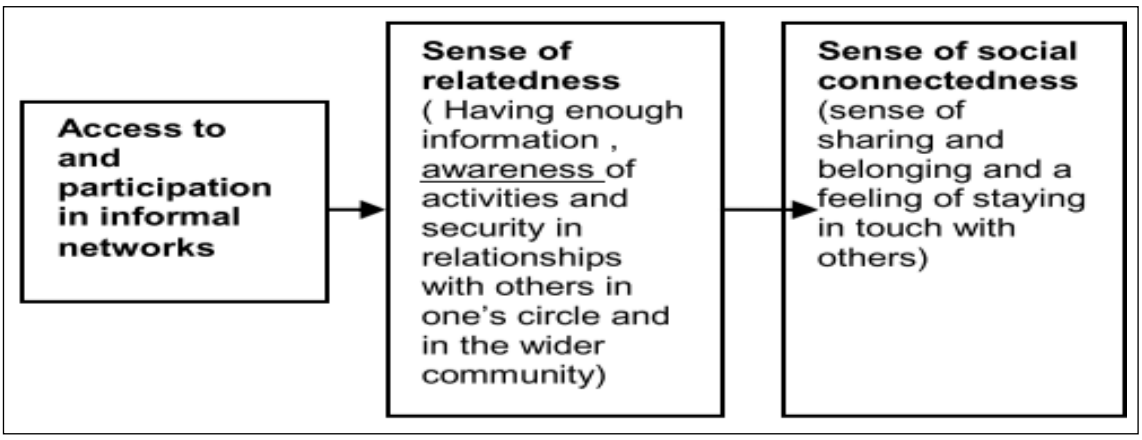

Figure 2.8 The Framework for the Sense of Social Connectedness

Source: Alias et al. (2011a)

2.7.5.1 The Theory of Change

Rogers (2014) used the Theory of Change as a methodology to promote social change. Many organizations, both private and public, as well as non-profit organizations, used it to provide an explanation for the process of change that was taking place by outlining the causal linkages between initiatives and predicting the short-term, immediate, and long-term outcomes (Walker, Mair, & Druckman 2018; Weiner 2009). In a typical application, the recognized changes are mapped out as the outcome's pathway, displaying the outcomes with logical relationships with respect to each other, sequentially and chronologically.

Each of these outcome boxes was assumed to be a prerequisite for the next, resulting in a causal-linkage relationship with some assumptions built in (Mayne 2015; Caldwell 2012; Connell & Kubisch 1998). Therefore, under these circumstances, any application of the Theory of Change would show a systemic flow of diagrams with inputs, change mechanisms, outputs, outcomes, and impacts (Caldwell 2012; Walker, Mair & Druckman

2018; Harries, Hodgson, & Noble 2014).

Shapiro (2006) espoused building the theories of change from other prevailing seminal theories, which would include a mutual process of developing the grounded theory through comparison with existing research literature, assessment of emerging hypotheses, and discussion with practitioners on findings and results iteratively. As a matter of fact, the theory of change has evolved from the field of programme and evaluation of the social and political changes during the mid-1990s (Msila & Setlhako 2013). Serrat (2017) argued, on the other hand, that the Theory of Change could also be used to develop a composite social economic indicator to indicate social economic improvement. He also argued for the Theory of Change, providing a transparent and robust framework to describe and prescribe societal systemic changes (Serrat 2017).

This was also supported by Harries, Hodgson, and Noble (2014), who proposed the Theory of Change approaches could be used for all types of organisations and communities to explain the systemic changes occurring and predict the desired outcomes. Rogers (2014) described the Theory of Change as a process, depicted by a series of boxes to describe the activities from inputs to outputs, outcomes and impacts, with logical flow. Rogers (2014) also suggested developing the Theory of Change as an intervention to determine the changes and adaptations required to emerging issues and decisions made by the related stakeholders.

The Theory of Change was made popular by Carol Weiss, who simply defined it as a theory of how and why an initiative would work (Connell & Kubisch 1998). Weiss used the Theory of Change to evaluate various societal and political programs to evaluate the effectiveness of those programs, as well as the relationships between the respective related

stakeholders and the funding bodies (Msila & Setlhako 2013; Connell & Kubisch 1998). She would challenge the developers of those community-based programmes to be specific in their adoption of the theories of change, would guide them, and would propose such guiding principles to ensure overall programme effectiveness and improvement (Msila & Setlhako 2013; Shapiro 2006).

It would not be the scope of this study to review and argue about the adopted Theory of Change approach. However, Figure 2.9 illustrates the Theory of Change logic as proposed for the Rural Community Centre model, which serves as the underpinning grounded theory for this study (Alias et al. 2011a). As such, this study would only identify the determinants, the impacts brought upon, and the proposed relationship framework for the Rural Digital Smart Village Enablement Program. The findings might reflect those of the theory of change as espoused by Alias et al. (2011) and would be deliberated in chapter 5 under the theoretical contribution.

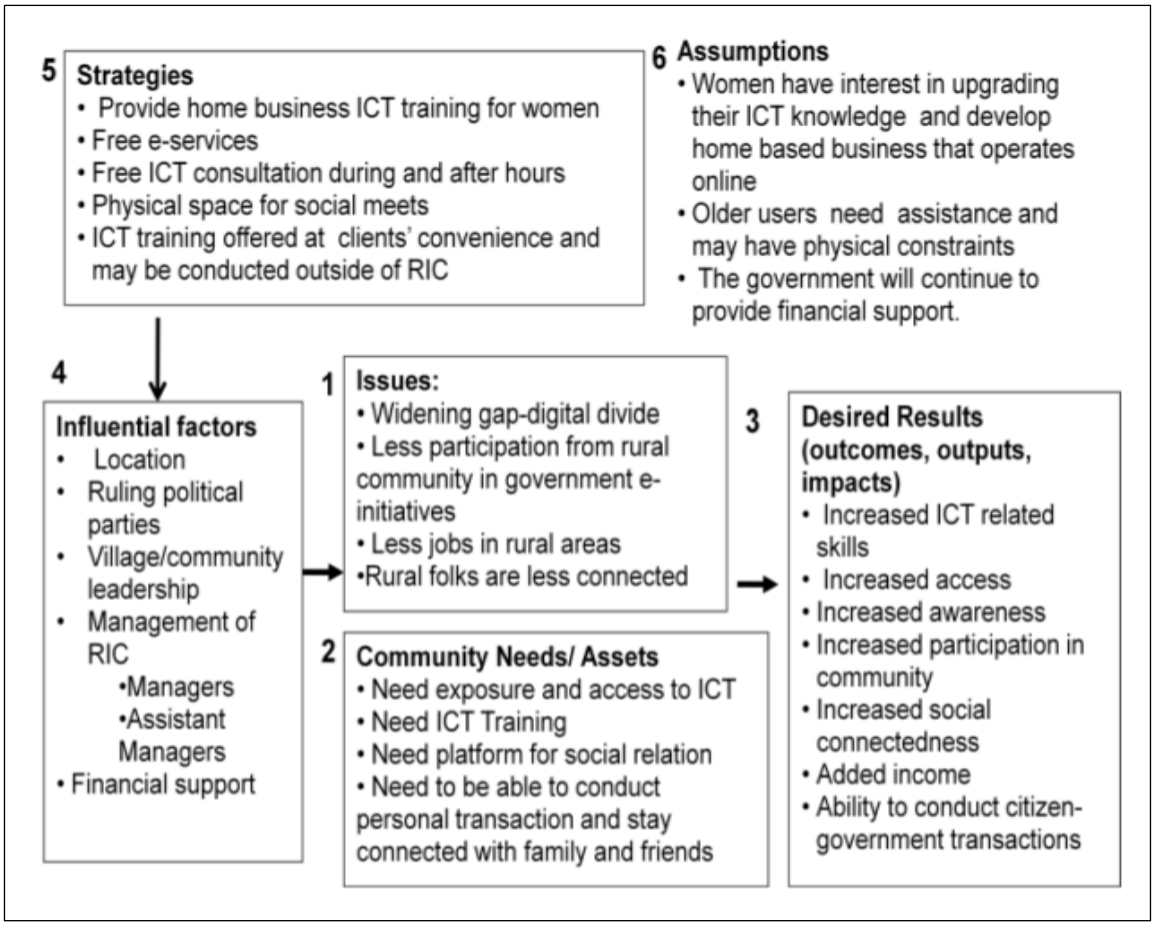

Figure 2.9 The Theory of Change Logic for the Rural Community Centre Model

Source: Alias et al. (2011a)

The study would not come up with its own Theory of Change Model for the proposed Rural Digital Hub, under the Smart Village Enablement Program, although this would be a good potential future study to be explored.

2.8 Debates and Gaps on Literatures

Ashmore and Price (2019) have postulated the need for the Rural Digital Hub to effectively address most of the socio-economic issues plaguing the rural community, such as the rural digital economy divide and exclusion. As explained extensively, the rural socio-economic issues plaguing almost all the rural and remote communities were the lack of digital connectivity, the high cost of infra and connectivity, the lack of relevant digital content and applications, low digital literacy, and demographic and geographical issues (ASHOK & UGC-JRF 2018; Bock et al. 2013; Pretorius & Sangham 2015). The rural digital divide was caused by a lack of digital connectivity and platform, which was caused by the high cost of infra and connectivity, which was greatly exacerbated by the remote geographical and topological terrain of most rural areas (Ellis 2012; Philip et al. 2017a; Henry 2019; Hindman 2000; Feldmann 2018).

As a result of these circumstances, rural communities have been excluded from all socioeconomic mainstreams, inadvertently contributing to the rural population's low digital literacy (Mohamed et al. 2012; Salemink, Strijker, & Bosworth 2017b; Haenssgen 2018). As a result of the lack of digital internet connectivity and low digital literacy, there was no urgent need for any rural digital services and applications, because the rural people did not recognise the relevance and necessity of such services (Bock et al. 2013; Townsend et al. 2016; Grimes 2003).

The government would need to provide the necessary high-speed digital internet connectivity to transform the current rural community centres by establishing rural digital hubs in rural areas (ENRD 2017b; Shahriar et al. 2014b; Razak, Malik, & Saeed 2013;

Ashmore, Price, & Deville 2019). Inadvertently, the surrounding villages near the rural community centres would also be provided for in order to realise the capital investment as well as to commercialise the digital services (Michailidis, Partalidou & Papadaki 2010; Fennell et al. 2018). There would be a direct causal relationship to rural socio-economic improvement by advancing the rural digital economy platform through the formation of the rural digital hub (ENRD 2017b; Mohd Noor, Hashim, & Md. Jamin 2020; Mohd Noor 2012).

Incidentally, having a rural digital hub would reduce rural digital literacy and create the relevant rural digital services and applications, which would further improve the socio-economic lifestyles of the rural folks (Mohd Noor, Hashim, & Md. Jamin 2020; Mohd Noor 2012; Heng 2020). Following that, rural residents could start their own businesses and trades by utilising the digital platform and services to market their goods and services to the economic mainstream (Ritzen 2021; Cik, Zagar, & Grgic 2018; Valchovska et al. 2015; Townsend et al. 2016; Räisänen & Tuovinen 2020).

As such, the case for the needs of a rural digital hub to promote rural digital literacy and socio-economic improvement was summarised as depicted in Appendix 16, as adapted from Ashmore and Price (2019). The formation of a Rural Digital Hub would serve as a public access point for rural folks to learn about information and communication technology, as well as give them the opportunity to access and use computers and other digital devices that may not be affordable for them (Pretorius & Sangham 2015; ENRD 2017b; Ashmore, Price, & Deville 2019). The hub would also serve as an incubator and working space for budding rural entrepreneurs to network, collaborate, and facilitate their trades (Ashmore & Price 2019; Uday 2018; Kamarudin, Untari, & Ngah 2018).

In addition, the hub would also provide facilities for training and developing competencies for budding rural entrepreneurs, as well as for cultivating new requirements for rural digital services and applications for the betterment of the rural communities (Ashmore, Price, & Deville 2019; ASHOK & UGC-JRF 2018; Mohd Noor 2012; Mohd Noor, Hashim, & Md. Jamin 2020). This would further complement the prevailing functions of the current Rural Community Centre as a One-Stop-Service centre for the rural community, with the many current programmes and campaigns driven by the Ministry of Rural Development (Shahriar et al. 2014b; Ngah 2012a; Mohd Noor 2012).

Mohd Noor (2012) asserted the significance of bridging the rural digital divide in order to achieve social and economic benefits for rural communities. Through rural digital divide improvement, the rural lifestyle would serve to improve the quality of the rural lifestyle vis-a-vis through sustainable socio-capital and economic improvement programmes (Mohd Noor 2012; Mohd Noor, Hashim, & Md. Jamin 2020; Noor & Ambali 2014). The Malaysian Communication Multimedia Commission has also produced a report detailing how high-speed digital internet connectivity will facilitate the digital transformation (MCMC 2018a).

There was much empirical evidence supporting the need for a national broadband policy to drive high-speed internet connectivity as well as provide the necessary digital platform and ecosystem to enable the digital economy toward successful socio-economic improvement for the country and the region as a whole (ENRD 2017a; Stenberg, Morehart & Cromartie 2009; Fahmi & Sari 2020; Philip et al. 2015). The countries with the highest internet connectivity and inclusive index, or those that have taken drastic steps to improve them, have a strong relationship with and contribute to sustainable economic growth and

development (The Economist Intelligence Unit 2021; OECD 2014; Szenkman, Pilat, & Astarloa 2018; World Bank 2016a; United Nations Conference on Trade & Development 2019).

The European Union, with its Euro Network Rural Development program, was instrumental in developing the Smart Village Conceptual Model through the introduction of a common national agenda to provide high-speed internet connectivity to enable and facilitate the rural digital economy of its rural areas (ENRD 2017b). In addition, many other countries and regions have recognised the need to provide their communities with fast connectivity and digital ecosystems to facilitate the revival of their fledgling economies (Hadi 2018; Ramakrishna 2018; Freeman & Park 2015). China's success story has been well documented in its successful implementation of the Taobao village programs, in eradicating rural poverty, improving the socio-economics of rural communities, and transforming China into an economic powerhouse, spawning new conglomerate giants like Ali Baba Group (Alibaba Group 2016; Li 2017b; Xia 2018; Oreglia, Liu, & Zhao 2011).

Figure 2.10 illustrates the impact of having good internet connectivity, which enables digital economic platforms to improve the nation's digital divide and rejuvenate the nation's economic growth. Every year, the Economist Intelligence Unit, sponsored by Facebook, conducts a worldwide survey to determine the countries' Inclusive Internet Index Indicators. These indicators would serve as a measurement of the country's digital divides, upon which, the higher the indicator readings would denote lower digital divides in those countries (The Economist Intelligence Unit 2017).

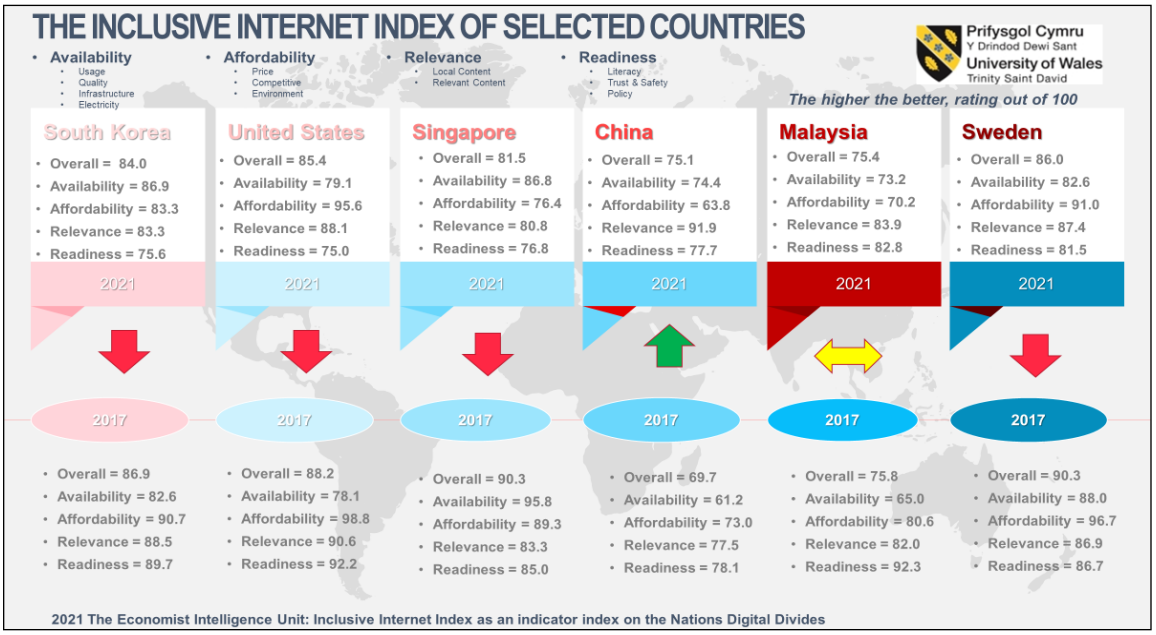

Figure 2.10 A Comparison of the Inclusive Internet Index as an Indicator Index on the Nations Digital Divides

Source: The Economist Intelligence Unit (2021)

The Inclusive Internet Index was measured by four Internet Indicators, which were: availability, affordability, relevance, and readiness. Each of these internet indicators would have their own attribute measurements; the internet availability would be determined by its usage, quality, infrastructure, and electricity, which would determine the reachability of the internet. Price, competitiveness, and the environment would all be factors in determining the affordability of internet connectivity to the general public. The Internet Relevance would consider both local and relevant content, which are inextricably linked. Internet (digital) literacy, trust and safety (internet usage security), and national policy governing internet usage and connectivity deployment would all be factors in Internet Readiness (The Economist Intelligence Unit 2017, 2020, 2021).

Malaysia was selected to benchmark against known leaders of high-speed broadband nations such as the United States, Japan, South Korea, its closest neighbour, Singapore, and the top-scoring nation, Sweden. It could be easily seen that Malaysia still has some ways to go to achieve the Inclusive Internet Index of the well-developed countries, as shown above, in terms of all the Internet Indicators.

However, when compared to China, the difference was not that big. The only marked difference was the ability of China to improve its Inclusive Internet Index drastically, when others had dropped, albeit not that significantly, from 2017 to 2021. Malaysia was fortunate in the sense that nothing changed much. Incidentally, Malaysia's economic growth was also quite stagnant if compared to that of China, which had produced tremendous economic growth since the beginning of the 21st century, contributed significantly by its grand rural digital economic transformation plan (Xia 2018; Li 2017a). It is worth noting that China has achieved the highest indicator score on relevance, which measures internet (digital) content and locality, outscoring the other countries significantly (The Economist Intelligence Unit 2021).

Roberts et al. (2017) inferred the need for the UK Rural Development policy to seriously drive and roll-out high-speed internet connectivity to tackle the rural digital divide, which had stalled rural social economic growth and curtailed rural businesses. Roberts argued for social capital gains through connectedness and social networking, which was similar to the argument made by Mohd Noor (2012) in her research. The Shapiro (2006) Theory of Change, which theorised on individuals' interactions with one another to catalyse social systemic change, was the grounded theory upon which this study was based.

The Smart Village Conceptual Proposition was based on this grounded theory upon which the proposed Smart Village Digital Framework and Eco-System would be the platform for the sustainability of socio-economic betterment of the rural communities as deployed in India and Europe (European Union 2018; Prakash Poul, & Nilesh 2017; Tomar et al. 2019; Smart Villages & Rural Mobility 2019). For China, the success story of its Taobao village would be the toss of many proponents of the Smart Village Conceptual Proposition, as well as the propagation of the Rural Digital Economy via the formation of Rural Digital Hubs (Alibaba Group 2016; Woetze et al. 2017; Xia 2018; Oreglia, Liu, & Zhao 2011; Information Services in Rural China 2012).

Malaysia had a similar Internet Inclusive Index to that of China. However, it has not been able to fully leverage its existing rural internet centres and rural development programmes to achieve the same level of success as China. The gap could be attributed to the slow response by the government in rolling out an aggressive national broadband agenda and a sustainable rural socio-economic improvement programme (Ngah 2015b; Jaganathan et al. 2018). The frequent change of government over the last five years, which was exacerbated by the Covid-19 Pandemic, may have resulted in further stalling of much-needed initiatives to revitalise rural areas (Heng 2020).

In addition, there was a gap in the academic literature to move forward from having merely internet connectivity at all the rural internet centres and rural community centres into the era of Digital Industry 4.0, which means having high-speed broadband connectivity and a digital economy to empower the rural economy's digital transformation programme (Mohd Noor 2012; Shahriar et al. 2014b; Alias et al. 2011a). China was a good success story, as most of the European Union countries, with India and Indonesia having started as

well on this rural digital economy enablement programme (Gaidhani 2018; Hadi 2018; Indira & Anupama 2016; Wolski 2018b; Visvizi & Lytras 2018).

This study fills gaps in the academic literature on the subject, as well as provides impetus for the government, in collaboration with the relevant internet service providers, to improve digital internet connectivity and coverage in rural areas.

2.9 Conclusion

In summary, this chapter assists in understanding better the literature related to rural community centres in this country. This chapter embodies a specific direction of the study in achieving its purpose of understanding better the development of the rural digital economy in Malaysia. Subjected to this, the following chapter assists in highlighting the methodology used in achieving the purpose and guiding the direction of this study.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter prescribes the method and procedures for the proposed research. An elaboration of the research design and the respondents of the study is shown. The chapter also discusses the data collection procedures, data processing, and data analysis for the study.

3.2 Research Design

The purpose of this study was to investigate a situation in which the researcher might be participating in the researched environment, endeavouring to interpret, analyse, and prescribe through the use of qualitative research techniques (Denzin & Lincoln 2013). Rather than using statistical methods, qualitative research gathers and analyses data mainly via the use of words, which allows meanings and interpretations to be created. Qualitative research, according to Creswell (2014), is a method for clarifying and understanding the meaning that individuals or groups assign to a social or human problem. Development of study questions and techniques, data collection in the respondent's natural environment, inductive analysis of the data by moving from particulars to broad themes, and the generation of judgements about the importance of the data are all aspects of the qualitative research process.

This study would use qualitative research methodology and approaches. The study would start with a problem statement from known causes and would attribute an investigation process to determine variable factors to build a framework to describe the phenomenon (Jackson, Drummond, & Camara 2007; Jabareen 2009). As shown in Figure 3.1, there were many popular types of qualitative research undertaken by researchers, which would be inductive in nature as the researchers would strive to describe the phenomenon based on observable interactions of the variables (Jackson, Drummond, & Camara 2007).

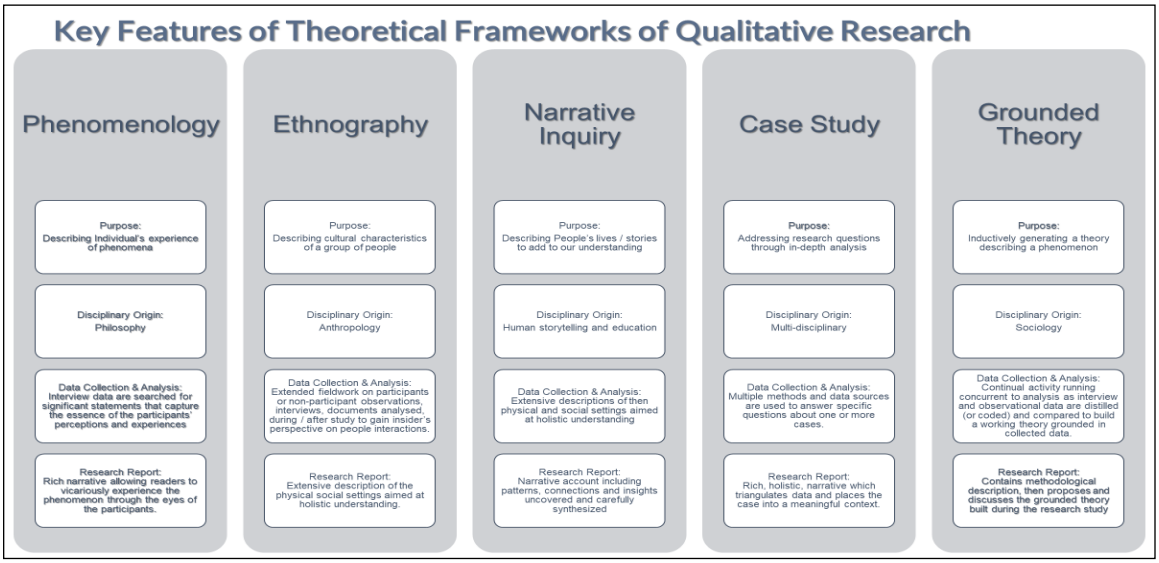

Figure 3.1 Key Features of Theoretical Frameworks for Qualitative Research

Source: Anon (2020)

For this study, the qualitative approach would focus on the Grounded Theory approach as the aim of this study would be inductive in nature to explore the variables identified to prescribe a theory or framework to describe the phenomenon (Khan 2014). Grounded Theory would begin with the research condition and the problem statement. The aim of the researcher would be to understand what was happening and how the respondents and stakeholders would be managing their respective roles. The common data collection methods to be used would be observation, conversation, and interview (Hamp-Lyons and Morrison 2007a).

Grounded theory was originally developed by Barney Glaser and Anselm Strauss in their 1967 book, The Discovery of Grounded Theory (Glaser & Strauss 1967). In response to the dominance of the hypothetic-deductive theory-testing approaches, they proposed grounded theory as a method for scientifically developing theories based on research data. Grounded theory is based on the interrelationship and iteration of data collection and data analysis. The analysis would begin as soon as the first data is collected, and the analysis could affect the subsequent data collection. The overall approach was usually depicted as inductive, but some writers argued that grounded theory also used abductive logic in its reiteration between data and the evolving theory (Reichertz 2007).

The format of the final written report may be changed if necessary. Individuals who engage in this mode of inquiry advocate for a research strategy that emphasizes the importance of an inductive approach, the importance of individual meaning, and the importance of presenting the complexity of a situation in an inductive manner. The depth of the research is valued more highly in qualitative studies than in quantitative studies, which are mainly concerned with finding trends and patterns across a representative sample

of individuals or events in their subjects' areas of interest (Marshall & Rossman 2011).

The researcher might then dig into the subtleties of why certain behavioural and communicative responses occurred, using qualitative data collection methods (Jackson, Drummond, & Camara 2007). The rigour and iterative nature of the interview or case study methods, for example, would allow for more in-depth explanations to be acquired. Furthermore, the data collected and analysed via qualitative research would contribute to a more in-depth understanding of the social processes under investigation (Corbin & Strauss 2008; Davidson 2009).

Considering these philosophical and theoretical perspectives, this study would employ a qualitative and inductive approach. The methods that were used are discussed in the next section. For this study, the qualitative approach generally adopted would be the Grounded Theory approach, to explore the antecedents identified inductively and to prescribe a theory or framework to describe the phenomenon (Glaser & Strauss 1967; Charmaz 2006). Figure 3.2 shows the research design diagram and the subsequent detailed steps to be undertaken:

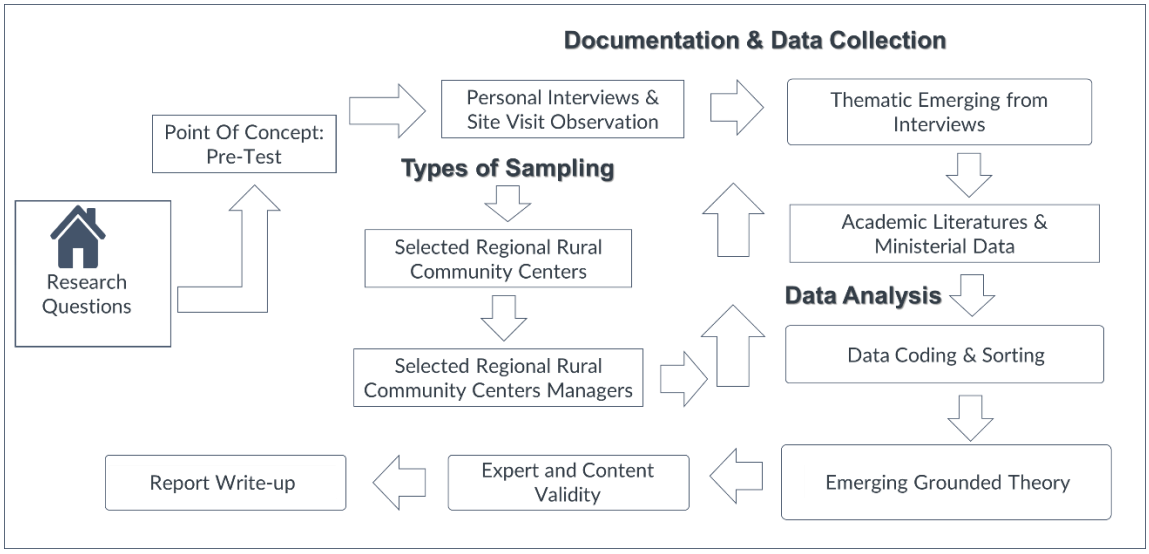

Figure 3.2 The Research Design

Source: Rose, Spinks and Canhoto (2015)

The Ministry of Rural Development had mandated Telekom Malaysia to commence with a Proof of Concept (POC) at the Rural Community Centre (RCC) located at Kampung Tui, in the district of Bukit Kepung, Pagoh, Johor. Therefore, the POC site for this study serves as a pre-test site for the Rural Digital Enablement Program to explore and identify the antecedents for the proposed framework and craft the interview protocol. Next, this study proceeded with the data collection that was comprised of personal interviews and site-visit observations at the selected Regional Rural Communities Centres (RCC).

This study also conducted a Site Visit Observation at the selected Regional Rural Communities Centres (RCC). The purposes of the observation are to observe the distance and remoteness of the RCC from the nearest town, as well as the condition of the RCC and the facilities available, such as internet connectivity and personal computers. Those selected RCCs had their managers selected for the in-depth interview sessions, which were

assisted and organised by the ministerial officers.

Then, this study derived thematic coding from the sets of data collected from the interviews transcribed and translated and the sites observed. Besides, this study also obtained the secondary data from the relevant ministerial officers and related agencies to strengthen and give credence to the research undertaken. Following that, this study codes and sorts the data. During this stage, as suggested by Charmaz (2006), the data collection and analysis happened concurrently. After this stage, this study developed a framework for the Smart Village Enablement Program, upon which content validity and expert validity were held with the stakeholders to present the findings and get their consensual agreement or endorsement before the report write-up.

3.3 Population and Sample

The mandate from the then Malaysian Ministry of Rural Development was to roll-out the Smart Village Program to all the 14,614 registered villages throughout the country (Strategic Planning, Malaysia Ministry of Rural Development 2019). This would require a timeline of 5 to 10 years, and hence, the ministry has initiated a start-up plan to first target the existing 191 rural community centres, commencing at one of the remotest rural community centres in Kompleks Penghulu Bukit Kepung District, under the Pagoh Parliamentary constituency in the state of Johor. This Proof of Concept (POC) site would serve as a pre-test site for the whole program.

3.3.1 Target Population

The target population would be the total of 191 rural community centres under the Malaysian Ministry of Rural Development. The distribution of these throughout the country is shown in Table 3.1. These 191 Rural Community Centres (RCC) were the hubs for all the rural community activities and programmes to be hosted. Of these 191 RCCs, only 157 had internet connectivity, with bandwidth ranging from 1 Mbps to 4 Mbps, localised to only serve the RCC but not the surrounding villages' area (Ministry of Rural Development 2018b).

Table 3.1

Target Population: 191 RCCs under the Malaysian Ministry of Rural Development

States	Regional	Total Of Rural Community Centres (RCC) Nationwide
Johor	Southern	24
Kedah	Northern	30
Kelantan	Eastern	15
Melaka	Southern	13
Negeri Sembilan	Southern	10
Pulau Pinang	Northern	2
Pahang	Eastern	20
Perak	Northern	13
Perlis	Northern	3
Sabah	East Malaysia	15
Sarawak	East Malaysia	6
Selangor	Central	9
Terengganu	Eastern	31
	Grand Total	191

Source: Strategic Planning, Malaysia Ministry of Rural Development (2019)

3.3.2 Cluster Sampling

The proposed sampling would be the theoretical sampling advocated by Glaser and Strauss (1967), the founders of the qualitative grounded construction research theory. This was when quantitative research approaches were the most accepted by social scientists then, as qualitative research was deemed subjective and lacked scientific analysis (Hamp-Lyons & Morrison 2007b). Hence, Glaser and Strauss (1967) had laid the foundation and framework for constructing a theory based on observation and qualitative analysis, which predominantly used interviews, memos, write-ups, thematic coding, and theoretical sampling for data collection and analysis (Bryant & Charmaz 2007; Charmaz 2006; Hamp-Lyons & Morrison 2007b).

Theoretical sampling would be more concept-driven than data-driven. It would be the process of allowing the research itself to drive the data collection and through which the thematic concept might emerge. These emerging concepts would then be elaborated upon, and further data would be collected, guided by these emerging concepts, until all the categories were exhausted (Corbin & Strauss 2008). However, for this study, the cluster sampling method had to be adopted.

Different regions would produce different data and perspectives, owing to regional differences in cultural beliefs and socioeconomic activities (Ngah 2015a; Hua 2011). Hence, the need to do a "cluster sampling" to represent the different regions of the country (McCombes 2019). Because Malaysia's regional development was divided into Northern, Southern, Eastern, Central, and East Malaysia, the sampling of RCCs must be representative of each region. For a typical qualitative ground research analysis, 13

interviews would be sufficient for the data collection and analysis (Gentles et al. 2015; Corbin & Strauss 2008; Yin 2011).

Therefore, at most 13 of the RCC managers would need to be interviewed for the data collection and analysis out of a total population of 191 RCCs nationwide representing the 5 regions. However, under the grounded theory approach, there would be no limit to the exhaustive nature of collecting the data. The data collected might even be less than the minimum 13, if the data findings had reached data saturation, meaning the findings were no longer yielding any new additional information (Charmaz 2006; Hamp-Lyons & Morrison 2007a; Charmaz & Belgrave 2012; Duffy, Ferguson, & Watson 2004). Besides, Dworkin (2012) also mentioned many articles, book chapters, and books that recommend guidance and suggest anywhere from 5 to 50 participants as adequate; therefore, the number of respondents in this study is considered acceptable and valid.

3.3.3 Locations of Research Activity

The locations of the research would be at the Ministry of Rural Development, situated in the Federal Government of Malaysia's capital city of Putrajaya, as well as the selected 13 rural community centres representing the 5 regions. The proposed locations would be as shown in Table 3.2, but subjected to approval and changes from the stakeholder, the Malaysian Ministry of Rural Development:

Table 3.2

Cluster Sampling Locations Undertaken from the Population of the 191 RCCs under the Malaysian Ministry of Rural Development

Regional	States	Rural Community Centre
Central	Selangor	RCC Kampung Sungai Lang Tengah, Banting
East Malaysia	Sabah	RCC Darau Laut, PPM No. 309, 88450 Menggatal, Kota Kinabalu
	Sarawak	RCC Buntal, Dewan Seri Buntal, Jalan Sultan Tengah, Kg Buntal,93050 Kuching
Eastern	Kelantan	RCC Paloh 2, Kampung Paloh 1, Tanah Merah
	Pahang	RCC Sri Makmur, Kampung Sri Makmur, Maran
	Terengganu	RCC Pasir Gajah, Kampung Pasir Gajah, Chukai
Northern	Perlis	RCC Lubok Sireh, Kampung Felcra Lubok Sireh, Kaki Bukit
	Kedah	RCC Gulau, Kampung Sungai Batang
	Pulau Pinang	RCC Sungai Cheenam, 14320 Nobong Tebal, Seberang Perai Selatan, P.Pinang
	Perak	RCC Jelintoh, Kompleks JKKK Kg Jelintoh, 31600 Gopeng, Perak
Southern	Johor	RCC Kg Tui, Bukit Kepong, 84030 Labis, Johor
	Melaka	RCC Pengkalan Rama Pantai, 101, Pengkalan Rama Pantai, 75100 Melaka
	Negeri Sembilan	RCC Jimah Baru, Kg Jimah Baru, 70000 Seremban

Source: Strategic Planning, Malaysia Ministry of Rural Development (2019)

3.4 Data Collection

The data collection for this study would comprise of site visit observations and semi-structured personal interviews. All these data collection methods will be elaborated on further in the following sections.

3.4.1 Site Visit and Observation

Site visits to the sampled rural community centres would start with the POC site at the RCC at Kompleks Penghulu Bukit Kepung, Pagoh, Johor. This site visit would greatly help in observing and experiencing life in the rural communities, not to mention, also help in elucidating greater empathy for the predicament of the rural communities (Bock et al. 2013). The Site Visit Observation at the selected Regional Rural Communities Centres (RCC) is to observe the distance and remoteness of the RCC from the nearest town as well as the condition of the RCC and the facilities available, such as internet connectivity and personal computers.

Furthermore, it would be more beneficial to conduct the interview in a natural setting where respondents would feel comfortable and open to generating ideas and sharing their opinions as well as feedback, as they would feel at home and in their natural elements (Jacob & Furgerson 2012). Razak, Malik, and Saeed (2013) have put forward the importance of meeting the rural community's needs at their respective rural locality requirements to properly understand their predicaments and the surroundings. However, in view of the time constraints and the remoteness of some of the said RCCs, the selection and scheduling of the site visits would be subjected to the conveniences of the ministry

officers in charge.

The sessions would be held at the respective selected RCCs. However, in view of the current Covid-19 Pandemic and the Movement Control Order (MCO) imposed by the government to contain the virus for more than a year and a half since 2020, the sessions would be held via telephone calls. Using virtual video links was not possible as almost all of these RCCs had poor internet connectivity, which was why this study was undertaken.

The personal semi-structured interviews would be held in that manner, whereas the site observation would make do with feedback from the interviewees. All the respondents would be asked to fill in their personal details and the form given prior to the session, which would indicate their consent to the exercise.

3.4.2 Arranging Personal Interviews

The interviews would be conducted with the 13 selected Rural Community Centre (RCC) managers based on the six regions of Northern, Southern, Eastern, Central, and East Malaysia from Sabah and Sarawak. Some insights might be able to be retrieved during the personal interviews as individuals might disclose different views with respect to their different regional backgrounds (Saunders, Lewis, & Thornhill 2015). Ryan, Coughlan, and Cronin (2009) highlighted some points worth noting when conducting interviews, either unstructured or semi-structured. According to them, the interview should be conducted in a very professional manner, consented to, and should be tape-recorded and verbatim, if necessary. They also highlighted that the interview should be done in an affable manner, not be too rigid and allow for flexibility. The length of the interviews should also not be

too long, as this may be unsettling for the respondents.

3.4.3 Conducting Personal Interviews

The interviewer would be required to describe the entire research study to the respondents so that they would know why they were called upon and why the background of the study would be important to them. The interviewer would also be required to explain the sampling logic and the process to the best of the respondents' knowledge. In addition, it would be best for the interviewer to acknowledge their bias tendencies and try to address them (Charmaz & Belgrave 2012; Hunter 2012).

Some other necessary preparation for the interviews. For example, the interviewers need to pick a location with the least distraction and explain the aim of the interview. Besides, the interviewers also need to discuss the required terms of confidentiality, describe the format of the interview, and designate the length of the interview that would usually take. Not only that, but they also have to provide their contact information to the respondents and tolerate the interviewee's seeking clarification on any of the questions. They also need to ensure the proper recording of the data, such as audio recording or note-taking.

3.4.4 Qualitative Research Interview Protocol

Yin (2011) espoused the benefits of using research protocols as mental frameworks to guide qualitative researchers in their quest for answers to their research questions. The research protocol should have the necessary questions to be asked, central to the subject under study, which would guide the lines of query, especially during the interview session (Yin 2011; Krueger 2002). Yeong et al. (2018) further suggested the four-step Interview Protocol Refinement (IPR) Framework for the proposed interview questions, which were to ensure alignment between the respective questions; an open-type of questions which encourage conversations; review of the interview protocols through feedback and pre-assessment of the interview questions, which was also supported by others (Yeong et al. 2018; Ryan, Coughlan, & Cronin 2009; Jacob & Furgerson 2012).

For qualitative grounded theory, the research protocol would be to aid the researcher in studying the social and psychological aspects of the interview process, directly collecting the data from the interview process, managing the data analysis concurrently, and developing the emerging theoretical framework from the process (Charmaz & Belgrave 2012). Charmaz and Belgrave (2012) espoused the researchers' approach to observing the respondents' concerns and further developing questions around those concerns for further analysis.

Charmaz and Belgrave (2012) also proposed semi-structured interviews to be conducted for a grounded theory qualitative approach. This would allow the researcher to always do iterative data collection and analysis, to determine any emerging themes throughout the data collection process, and to decide whether to continue or stop the data

collection process (Charmaz & Belgrave 2012; Wimpenny & Gass 2000; Duffy, Ferguson, & Watson 2004).

A sample of the grounded theory interview research protocol is attached in Appendix 1 for reference. The interview protocol questions have been constructed from seven themes as identified from the pre-assessment at the Proof of Concept (POC) site at RCC Kampung Tui and from the Ministerial report resources. These themes include lack of digital connectivity, high cost of infra and connectivity, no relevant digital content and applications, socio-economic issues, low digital literacy, demographic and geographical issues, as well as the need for national broadband policy.

Duffy, Ferguson, and Watson (2004) also espoused the use of a loose semi-structured interview for grounded theory research approach as the best way to go about it, especially after the pre-assessment with pre-determined themes as described above. Having a strictly structured interview protocol was not favoured under the Grounded Research Qualitative Approach (Jacob & Furgerson 2012; Charmaz & Belgrave 2012; Castillo-Montoya 2016). The loose semi-structured interview protocol for this study was attached in the appendices, as adopted by Hunter (2012) and Gooding (2005).

3.4.5 Transcription and Translation

Since the interviews would be conducted with the targeted sampling to put them at ease, the whole interview process would be conducted in the native Malay language, as all the RCC Managers were from Malay ethnic groups. The whole interview would be recorded, with the assistance of an audio recorder, from which the transcription would be made. The translation from the Malay native language to English would be done word for word and also in accordance with the context of the answers given (Corbin & Strauss 2008; Charmaz 2006).

The process of reproducing word-for-word verbal data recordings into exact written text descriptions was defined as verbatim transcription (McLellan, MacQueen, & Neidig 2003). This would be very pertinent as some of the issues raised during the literature reviews might be retraceable if the verbatim transcription was made available to the researcher (Davidson 2009). The data gathered through the combination of Interview Verbatim Transcription and Translation would be extremely beneficial in inducing thematic coding for data analysis purposes, particularly in developing a grounded theory for the said research (Glaser & Strauss 1967; Charmaz 2006; Khan 2014; Rose, Spinks, & Canhoto 2015).

3.5 Data Analysis

Under qualitative research, the analysis technique could be the most crucial and daunting task, as the analysis would not be as straightforward as one might find under quantitative research (Sahay 2016). There were several techniques used to analyze research data qualitatively under the qualitative method, including hermeneutic analysis, narrative analysis, discourse analysis, grounded theory analysis, cross-cultural analysis, and content analysis. Since this was a Grounded Research Theory, the analysis would adopt the Grounded Theory Analysis approach, which would be to identify the thematic categories and concepts emerging from the data collected, and to try linking those concepts into a theoretical framework (Glaser & Strauss 1967).

3.5.1 Nvivo Software

For qualitative research, the most common software system used would be QSR NVivo (Mohd Tobi 2019; Hutchison, Johnston, & Breckon 2010). Hutchison, Johnston, and Breckon (2010) exemplified the usage of QSR NVivo for their qualitative grounded data analysis in the coding and arrangement of the thematic concepts emerging from the data collected. Hamp-Lyons and Morrison (2007) also detailed using NVivo for their Grounded Research Theory approach to derive emerging thematic coding during the data analysis.

3.6 Reliability

Previously, reliability and validity criteria were mostly associated with quantitative research. Golafshani (2003) stated that this was because reliability and validity were embedded in the positivist perspective and were only recently reconsidered in the qualitative research paradigm. He also explained that the reliability term would mean that the results or observations were able to be replicated and repeated, given the same constraints and constructs. The main adjective associated with reliability would be consistency, which is not that different from quantitative research (Noble & Smith 2015). Gibbs (2007) further indicated three reliability procedures. The first procedure is checking the transcript to ensure no obvious mistakes were made during verbatim transcription and the second procedure is ensuring proper, effective coding was done and there was no deviation from the coding definition during the coding process. Then, the third procedure is consistently comparing the data collected with the coding by making accurate memos about the coding and their definitions.

This undertaken research would also be using the NVivo software to assist in the data collection, coding, and analysis, which would also contribute to ensuring the reliability of the research (Hutchison, Johnston, & Breckon 2010).

3.7 Validity

As such, validity, on the other hand, would be to recognise the actual truth value of the research findings and to clearly and accurately extant the respondents' perspectives, irrespective of the researcher's personal experiences and observations, while recognising the existence of multiple other realities and bias (Noble & Smith 2015). Validity would be a term associated with instrument accuracy, which would give the required and expected measurement (Whittemore, Chase, & Mandle 2001).

Processual validity would support good research and would also help in reflecting and guiding the research process (Jr, Abib & Hoppen 2019). By having personal interviews with the relevant and related stakeholders of the rural communities, the reliability, trustworthiness, and validity of this study process would be strengthened (Krueger 2002).

3.7.1 Pre-Test from Proof of Concept (POC)

A pre-test was derived from the proof of concept done at the RCC Kompleks Penghulu Bukit Kepong, Pagoh, Johor in July–September 2019. The summary report could be referred to further in Appendix 4. A pre-test would be one of the validity tests undertaken to ensure the validity of the research questions and the subsequent interview protocols for the actual data collection (Charmaz 2006; Charmaz & Belgrave 2012).

The Proof of Concept (POC) was part of the proposal undertaken by Telekom Malaysia (TM) to prove the concept of Rural Digital Hub Conceptual for the propagation of the Rural Digital Economy enablement program for the Rural Community Centres (RCC) nationwide. The selection of the above POC location was decided upon with the

esteem of the then Malaysian Minister of Rural Development. In this POC, subsequent round table discussions were conducted with the said RCC Manager and the rural community and the village councils. The ministerial officers with TM and other selected industry players from the private sector took part in doing briefings and information gathering from the local rural communities, looking at their current socio-economic activities and ways of designing improvement programs and rural digital services that might be useful and relevant.

TM, on the other hand, was tasked with providing high-speed broadband connectivity for the RCC Kompleks Penghulu Bukit Kepong, which was duly completed within 3 months. The interview protocol was designed based on the information and feedback gathered during this POC period, a copy of which could be referred to in Appendix 1 of this study as well.

3.7.2 Expert Validity and Content Validity

This study also performed expert validity and content validity. The expert validity has been done by adding more value to the validity and reliability of the data, such as the precision of the findings or themes of the study that have been validated by the stakeholders in this study, such as the TM and KPLB. In other words, these stakeholders validate all of the themes identified in this study. Regarding content validity, it is used to support or convey the findings (themes) with other rich descriptions of the setting. This approach was used by looking for evidence in earlier trustworthy publications to support the main findings from the respondents. The results of this study are more realistic, richer, and

trustworthy.

3.8 Ethical Consideration

Some ethical dilemmas would prevail during the many phases of the data collection activities. The many stakeholders involved in the research would also need to be ascertained and address the respective ethical issues (Kumar 2011). Kumar (2011) also identified these stakeholders for whom the researcher would need to address their respective ethical issues: the research respondents or subjects, the researcher him/herself, and the sponsoring organization.

The respondents would need to be protected and asked for their consent before attending the interviews. The researcher would need to get their written consent, as well as a written commitment from the respondent to ensure partiality and anonymity in the research reporting (Saunders, Lewis, & Thornhill, 2015). In addition, for this particular research undertaken for a client, in this case, the Ministry of Rural Development, it would be prudent for the researcher to obtain a letter of consent and authorization from the Secretary General's office of the ministry.

This letter would also serve as support for the researcher as well as an enabler for the respondents to give full closure throughout and during the data collection activities. In addition, the researcher would also be required to obtain a letter of consent from Telekom Malaysia, as the appointed telco by the ministry, culminating in a Non-Disclosure Agreement.

3.9 Conclusion

This chapter described in length the qualitative grounded theory research design, the target population and the mandated sampling, the data collection methods, the proposed data analysis, as well as the ethical considerations. From the research questions and the mandate given by the client, which was the Malaysian Ministry of Rural Development, the qualitative grounded research theory would be the best approach for this study undertaken.

CHAPTER FOUR
RESEARCH FINDINGS & DISCUSSION

4.1 Introduction

This chapter will further discuss the results and findings of the study to describe the development of the rural digital economy in Malaysia. As mentioned in the earlier chapter, this study aims to identify the factors that will influence the start-up of Malaysia's rural digital economy. Besides, this study also motivates us to analyze the impact of launching the Rural Digital Economy via the Smart Village Enablement Program and how it would benefit rural communities. This study also aims to recommend the framework for the Smart Village Enablement Program in initiating the Rural Digital Economy in Malaysia.

In discussing the findings of this study, the names of the total of 13 respondents were pseudonyms, not real names, as promised to all respondents during the data collection process. This was intended to maintain the personal confidentiality of the respondent. The researcher's and respondent's safety considerations should be examined to avoid being exploited by others, which would leave a negative image. To provide meaning to the data acquired in this study, the data was discussed in this chapter to address the research questions raised in Chapter 1. Firstly, the demographic data was analysed to define the background of the employees. Then, a thematic analysis was conducted to categorise the employees' points of view.

4.2 Demographic Data

Table 4.1 shows the demographic profile of respondents gathered during the interview. These included background information on the subjects' age, years of job experience, marital status, gender, and ethnicity. Data was gathered from a total sample of (N = 13) people from 191 RCCs. According to the data, the bulk of the respondents were between the ages of 31 and 45. Following that, 61.5 % (N = 8) worked for three to four years, 23.1 % (N = 3) for more than five years, and 15.4 % (N = 2) for one to two years. 46.2 % (N = 6) of the respondents were married, 38.5 % (N = 5) were single, and 15.4 % (N = 2) were divorced. In this study, nine of the respondents were female, and four were male. Finally, 97.3% (N = 12) were Malay, with 7.7% (N = 1) being a Malbari Muslim native from India.

Table 4.1

Demographic Profile of Respondents (n=13)

Variables		Frequency (n)	Percentage (%)
Age	25-30	2	15.4
	31-35	3	23.1
	36-40	3	23.1
	41-45	3	23.1
	>45	2	15.4
Years Working Experience	1-2 years	2	15.4
	3-4 years	8	61.5
	>5 years	3	23.1
Marriage Status	Single	5	38.5
	Married	6	46.2
	Divorced	2	15.4
Gender	Female	9	69.2
	Male	4	30.8
Ethnicity	Malbari	1	7.7
	Malay	12	92.3

4.3 Thematic Data Analysis

In qualitative research, thematic analysis would be a commonly used method of analysis. Braun and Clarke (2006) define thematic analysis as a tool for the identification, review, and reporting of trends in data. They added that thematic analysis was a fundamental analytical method that described and explained the data to improve its role in qualitative research. It would explain the data in detail and would deal with the various subjects by analysis (Boyatzis 1998). Thematic analysis would allow the researcher to systematically analyse the relationships between hypotheses and compare them with the replicated data. Using thematic analysis, it was possible to link the various ideas and points of view of the respondents and compare them with the data obtained at different times during the project in different circumstances, plus all the possibilities for interpretation.

According to Joffe and Yardley (2004), the theme would classify the data into a large amount to present the material of the thematic analysis. The explanation was that even though a single statement was important, it would not adequately describe the entire story as a complete reflection of what the researcher was aiming for. One critical step was to review the "themes" to ensure that they accurately represented the entire text. Miles and Huberman (1994) reported that it was necessary to check themes in the early stages of the production of the data analysis.

It was suggested that the researcher should have an external reviewer to evaluate and identify the themes. This would allow the other person to also identify the common recurring themes that are compatible with those found earlier in the text. Subsequently, the researcher could apply his or her reviews to an objective analyst. This would allow the

researcher to compare the two sets of details. Charmaz and Belgrave (2012) also agreed with this approach, saying that it would achieve the efficiency of theme coding analysis.

In this study, a general inductive approach to qualitative assessment data analysis was used (Hutchison, Johnston, & Breckon 2010). All ten discussions were digitally recorded, and the verbatim translated transcript was produced. Using the NVivo 12 Plus computer programme, the transcripts were analysed. The next step involved coding the data in the transcripts and organizing them into groups or themes. The definition of the thematic research themes was to ensure methodological precision. Braun and Clarke (2006) claimed that the theme was an abstract object that would bring a recurrent experience and its varying manifestations of meaning and identity; the subject captured and accepted the essence or base of experience into a concrete unit.

Themes were characterized by bringing together concepts or events that were often meaningless when viewed on their own (Aronson 1995). The theme would not actually focus on quantifiable measurements, but rather on whether it would measure anything important in line with the overall research question (Braun & Clarke 2006). The emerging themes for this study were the factors that were determinants in initiating the rural digital economy in Malaysia and the impact of initiating the rural digital economy. Each theme has been classified in Table 4.2.

Table 4.2

Themes, Questions and Remarks

Themes	Questions	Remarks
Factors determinants in initiating the Rural Digital Economy in Malaysia	Is your Rural Community Centre having sufficient Internet Connectivity? How is the Internet Connectivity at the surrounding area? Who is your Internet Service Provider?	Q1
	Please describe the interior of your centre. Include the general size, number of computers, overall look. Please also describe the exterior of your centre and where is it located. How far is the centre to the nearest major town or city? And is it located in a hilly area or in a valley?	Q2
	How does the Rural Community Centre is being used by the rural communities? What are the typical activities and programs conducted, and who are the typical respondents? How are the internet facility is being used?	Q3
	What has contributed to the effectiveness of the centre? What barriers had to be overcome? Are the people coming or the surrounding rural communities have the capacity and capability to use and access digital technology? Can they afford it?	Q4
Impact of initiating the Rural Digital Economy	How do the community come to the centre? Do the adults bring along their children? If so, what do the children do? Mostly men or women who frequented the centre?	Q5
	What do you think that can make this centre	Q6

	more effective? How can the centre perform better for the improvement of to rural communities socio-economic?	
	How are the major decisions made at the centre? Can you make the decision or must refer to the Ministerial of Rural Development person in charge? How is support from the Ministerial and other Government Agencies?	Q7
	Describe the partnerships with other organizations (NGOs or Private Sectors) that have been important to the development of the centre (if any).	Q8
	Based on your own personal experience and opinion, what would you say is the best way to measure any centre's effectiveness? And how has it benefit the rural communities?	Q9

4.4 Data Findings

A total of 13 interview transcripts were collected from the cluster sampling of the selected RCCs. The translated transcripts were imported into the NVivo Qualitative Data Analysis system for further investigation. A summary of those transcripts was exported and is displayed in Table 4.3.

Table 4.3

Exported Listing of Transcripts from NVivo Qualitative Data Analysis

No	Items Descriptions	Codes	References	Modified on
1	Interview Transcription for RCC Sg Cheenam, Nibong Tebal, P.Pinang.	41	120	27/9/2021 3:53 PM
2	Interview Transcription for RCC Bukit Kepong	42	117	20/9/2021 10:31 PM
3	Interview Transcription for RCC Felcra Lubuk Sireh	44	114	20/9/2021 10:49 PM
4	Interview Transcription for RCC Jelintoh, Perak	47	154	20/9/2021 11:00 PM
5	Interview Transcription for RCC Layang-Layang, Kluang, Johor	46	151	27/9/2021 3:39 PM
6	Interview Transcription for RCC Sg Lang Tengah, Selangor	42	134	27/9/2021 4:01 PM
7	Interview Transcription for RCC Darau Laut, Menggatal, K.Kinabalu, Sabah	36	80	7/1/2022 11:02 AM
8	Interview Transcription for RCC Gulau, Kampung Sg Batang, Kedah	35	76	9/1/2022 1:02 PM
9	Interview Transcription for RCC Jimah Baru, Seremban, N. Sembilan	38	79	9/1/2022 1:42 PM

10	Interview Transcription for RCC Paloh 2, Gua Musang, Kelantan	44	101	9/1/2022 1:55 PM
11	Interview Transcription for RCC Pasir Gajah, Chukai, Terengganu	33	97	9/1/2022 4:32 PM
12	Interview Transcription for RCC Pangkalan Rama Pantai, Melaka	38	97	7/1/2022 11:13 AM
13	Interview Transcription for RCC Sri Makmur, Maran, Pahang.	22	49	9/1/2022 5:07 PM

Table 4.4 lists out the identified codes and references from the interview transcripts as exported from the NVivo Qualitative Data Analysis system.

Table 4.4

Codes and References for Theme 1

No	Items Description	Files	References	Created on
1	Factors of initiating the Rural Digital Economy	13	174	5/1/2022 10:44 AM
1.1	Internet & Digital	13	87	17/1/2022 5:21 PM
1.2	Function of RCC	8	35	25/9/2021 10:04 PM
1.3	Geography Location	13	19	25/9/2021 10:04 PM
1.4	Collaboration	12	17	25/9/2021 10:04 PM
1.5	Decision Making	12	16	25/9/2021 10:04 PM

Table 4.5 lists out the identified codes and references from the interview transcripts as exported from the NVivo Qualitative Data Analysis system.

Table 4.5

Codes and References for Theme 2

No	Items Description	Files	References	Created on
2	Impacts from initiating the Rural Digital Economy	13	253	5/1/2022 10:45 AM
2.1	Effectiveness of RCC	13	102	25/9/2021 10:04 PM
2.2	Establishment of RCC	13	42	25/9/2021 10:04 PM
2.3	Ethnicity	13	41	25/9/2021 10:04 PM
2.4	Demography	13	37	25/9/2021 10:04 PM
2.5	Program and Activities	8	31	25/9/2021 10:04 PM

According to the study's findings, there were various components that explain the rural digital economy in Malaysia. Based on the combination of several themes for Research Question 1 and Research Question 2 that had been discussed above, the following was shown in Figure 4.1. It showed the Cluster Analysis as generated by the NVivo Qualitative Data Analysis through the Pearson Correlation Coefficient Similarity Analysis. The cluster analysis showed the similarity of the codes identified, and these codes were

interlinked according to the identified themes 1 and 2 of the study.

Theme 1 would be the Research Question 1, identifying the factors, and Theme 2 would be the Research Question 2, identifying the impacts. The relationship derived from both Theme 1 and Theme 2 would be the relationship framework derived for Research Question 3. Figure 4.2 and Figure 4.3 showed the Cluster Analysis as generated by the NVivo Qualitative Data Analysis through the Jaccard's Coefficient Similarity Analysis and Sorenson's Coefficient Similarity Analysis, which yielded an almost similar finding. This would strengthen the reliability of this research and the findings as extracted and recorded from the selected respondents.

The findings of the study have been demonstrated through the data that has been collected and evaluated in Malaysia's rural digital economy. The relationships of this study are meant to look at the factors initiating the rural digital as well as the impact of the rural digital. In total, there were five sub-themes each that existed between the two themes. Under the theme of "Factors of Initiating the Rural Digital Economy", the identified sub-themes were Collaboration, Decision Making, Functions of RCC, Internet Digital and Geographical Locations. Decision-making and collaboration were linked via an associative relationship, depicting these two variables' interdependence on each other.

Under the theme of "Impacts of Initiating the Rural Digital Economy", the identified sub-themes were Effectiveness of the RCC, Establishment of the RCC, Ethnic, Demographic, and Program Activities at the RCC. Both themes were linked by an associative relationship, which demonstrated that both variables were interdependent on each other.

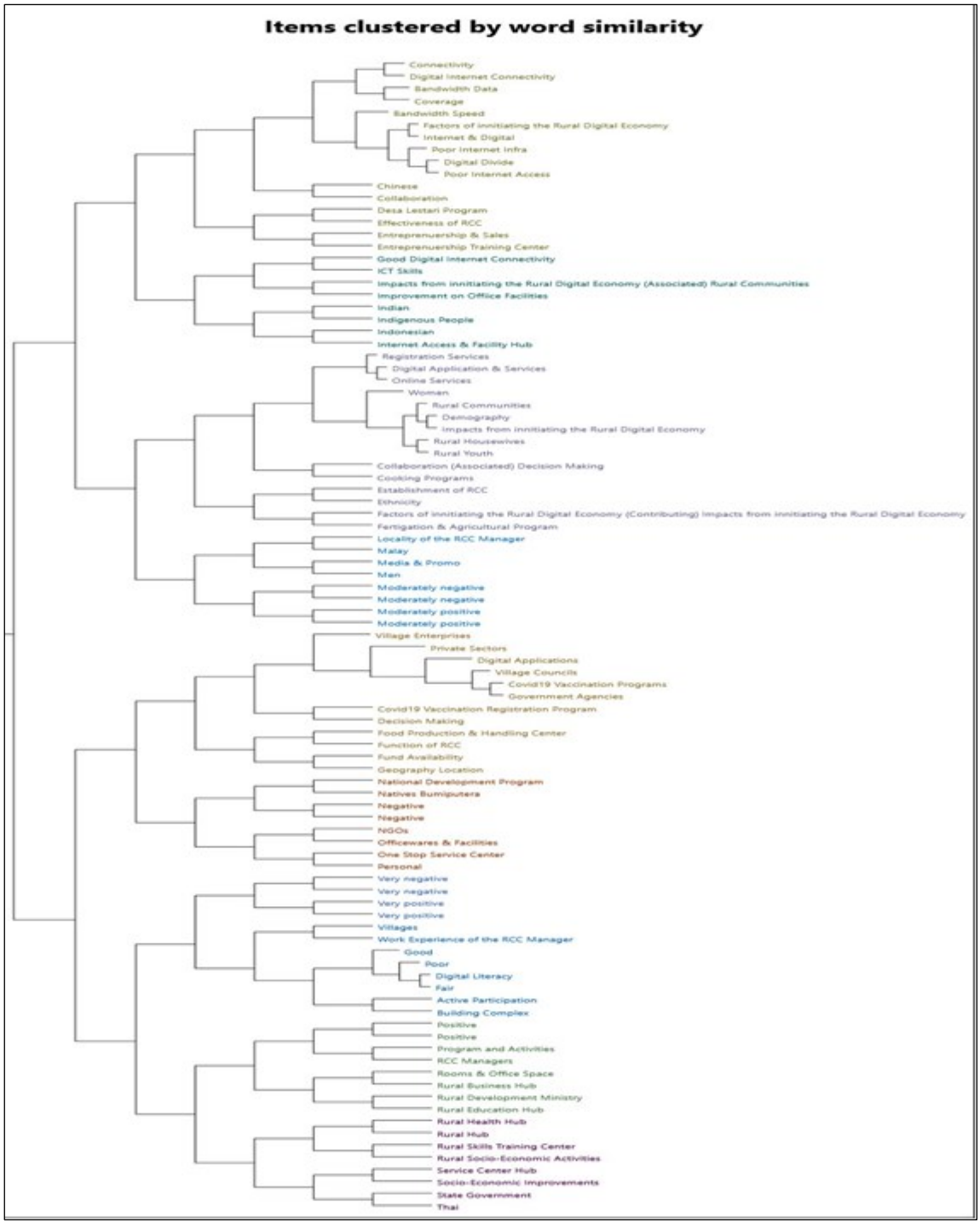

Figure 4.1 Cluster Analysis through the Pearson Correlation Coefficient Similarity

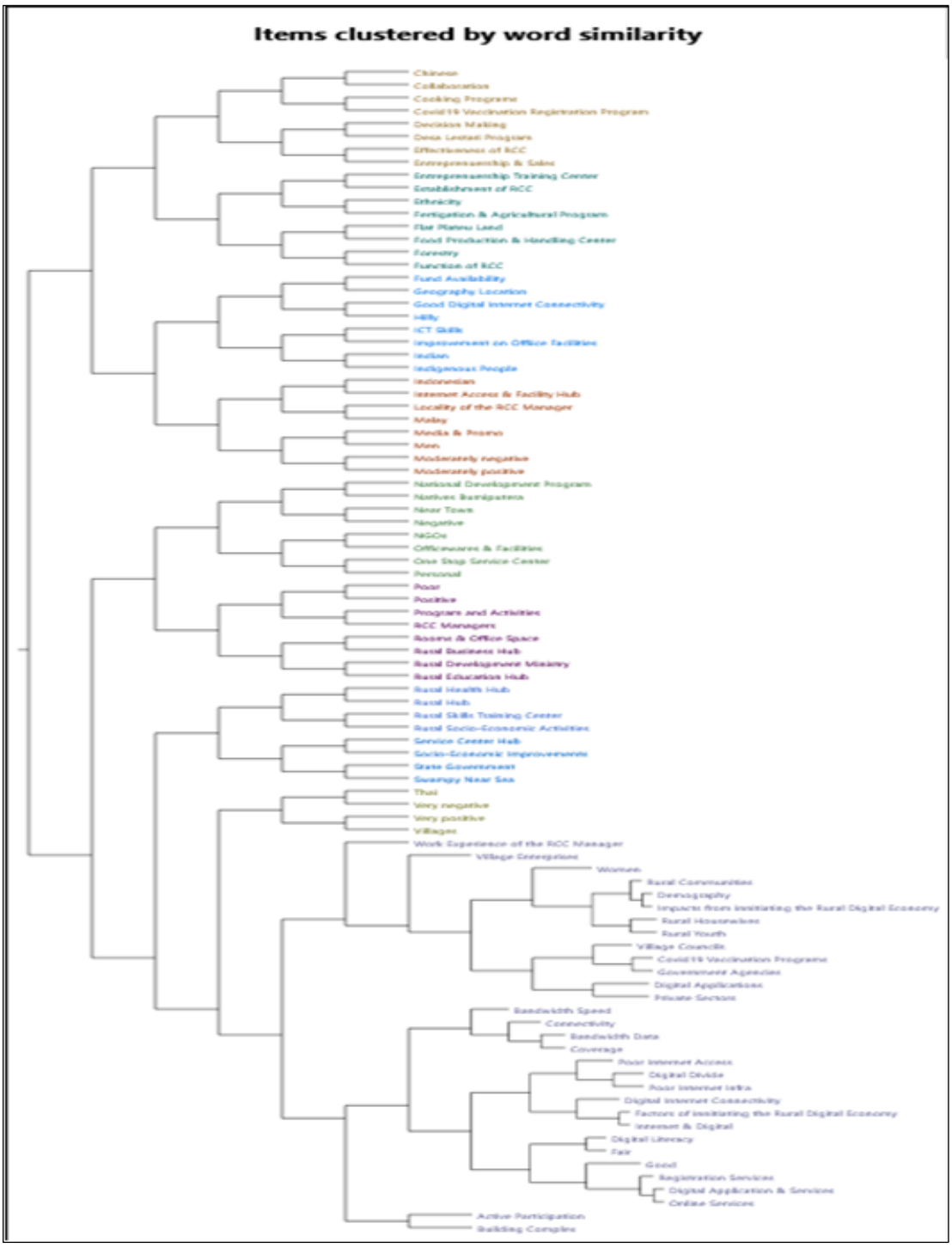

Figure 4.2 Cluster Analysis through the Jaccard's Coefficient Similarity

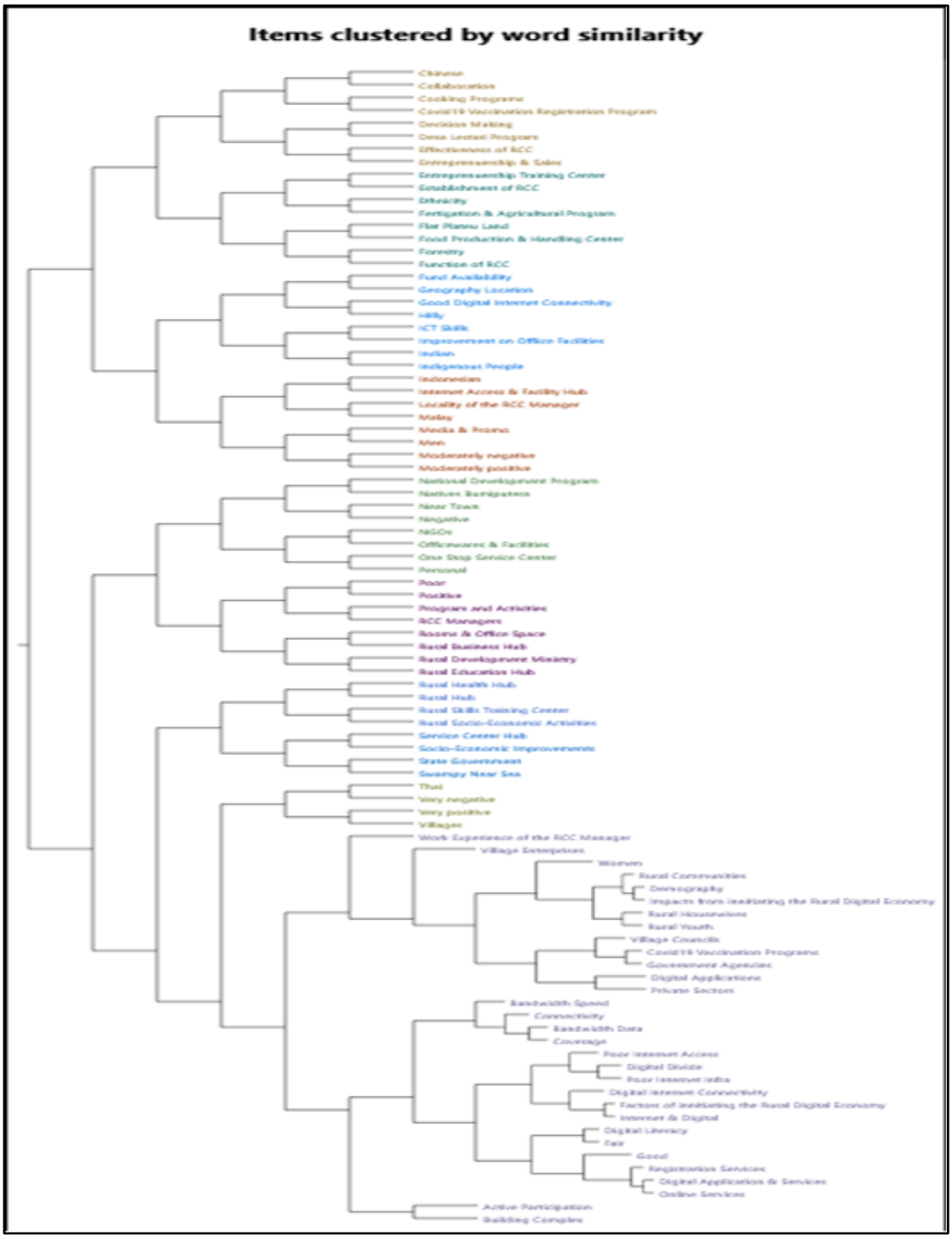

Figure 4.3 Cluster Analysis through the Sorenson's Coefficient Similarity Analysis

4.5 Discussion of the Findings

This discussion section elaborates in lengthy details on all the findings and relates them to the research questions and the research objectives. The discussion will be supported by literature reviews and with cited quotations from the respondents, especially on the theme of the discussion with regards to how the themes and sub-themes were identified and their significance from the academic literature.

4.5.1 Research Question 1: Discussion on the Factors of Initiating the Rural Digital Economy

This section discusses the answers to research question 1 by using qualitative data analysis from the interview transcripts. In addition, qualitative data in the form of interview excerpts was used to support the qualitative findings. New themes that emerged from the interview excerpts were also presented. The findings of the factors in initiating the rural digital economy in Malaysia were presented in order according to the research objectives and the research questions of this study. From the findings, six new sub-themes were created, which were collaboration, decision-making, the function of RCC, geography, the internet, and digital.

4.5.1.1 Collaboration

Collaboration has been identified as one of the subthemes that contribute towards the factors in initiating the rural digital economy. The outcomes of the interviews showed that the respondents regularly mentioned negative and positive collaboration. Statistically, there were 38.5% of the total 13 respondents who mentioned negative collaboration. On the other hand, 61.5% mentioned positive collaboration.

According to Zerrer and Sept (2020), collaboration would enhance the way the respective teams work together and resolve issues. This would lead to greater creativity, more efficient procedures, higher success, and enhanced communication. In this context, the majority of respondents reported positive collaboration with other organizations, which provided an opportunity to spread rural digital economy activities. According to Respondent 2, "We required support and good collaboration from the various stakeholders here, namely the Village Community Council (MPKK), as well as the NGOs and associations here...", according to Respondent 2. Respondent 3 also admitted, "Like MARA, KEMAS, and Malaysian YOUTH, they are also doing programmes here, as are the other associations and groups. There are too many to remember. There is one called "COMBI", and people use these RCC facilities to run programs for the rural residents here that could kickstart the rural economy.

Aside from that, Respondent 7 stated, "With NGOs and private sectors, the activities are greatly reduced." If there is even once or twice, there was one time with an NGO that focuses on agriculture, sponsored by Felcra in 2012. The manpower was provided by another NGO – the Malaysian Institute for Sustainable Agriculture, with its

centre in Gombak. " Therefore, positive collaboration with other parties would provide the platform for the rural people to reignite their economy by enabling them to sell their local products and services while at the same time enabling them to communicate, cooperate, and exchange skills and knowledge (Fahmi et al. 2019; Lackovi & Ivanovi 2021; Christy et al. 2020).

Furthermore, Watson et al. (2021) highlighted in their study the facilitating opportunities that could create and generate better income, particularly for rural communities, which is directly related to the findings mentioned by Respondent 4: "It is better if we focus more on activities and work with local communities such as the Village Community Council (JKKK), KEMAS, and the mosque." Furthermore, prior to the arrival of the Covid-19 pandemic, the opportunities for positive collaboration were clearly better, as indicated by Respondent 9, "We have our own cultural exchange workshop." Before the Covid-19 Pandemic, every year we would get adopted children from Japan, Korea, and China. They were all involved in the bio-fertilizer project with UiTM, and how the waste bio-fertilizer was produced.

Waizenegger et al. (2020) argued that there are numerous barriers to positive collaboration between NGOs and the rural community, which jeopardize the opportunity to launch the rural digital economy. Alsamhi and Lee (2021) bolstered this argument by citing the difficulties in obtaining positive collaboration between other parties and rural residents. According to Respondent 10, "all collaborations with external agencies must be paused due to the Covid-19 Pandemic." We also had collaboration with KEMAS for the Qur'an recitation classes, which we will start again soon. "

In addition, negative collaboration was also recorded from interview transcripts collected from the respondents. As postulated by Lachance and Rose (2020), a team's failure to collaborate might occur for a variety of reasons, with similar observed effects such as emerging factions, battle-lines drawn, communication breakdown, and growing distrust. This would result in plummeting productivity and efficiency and disrupt cooperation and creativity. Hence, in this context, the negative collaboration has given negative perspectives and false hope to the local community. Respondent 1 mentioned this as "That was the thing." After that event, and the change of minister, there was no more contact from any of them. " From this answer, it is clearly stated that collaboration between the NGOs and private sectors ceased to happen after changes in the ministry and, subsequently, the priorities.

The local community would need to adapt to the changes in order to ensure sustainable positive collaboration to promote the rural digital economy. Another respondent 6 emphasised the negative collaboration caused by leadership changes, saying, "There is a lack of activity with agencies and NGOs here." This is because the Gopeng area is under the political opposition ADUN area. Because of that, I do not dare make a programme if there are activities that will involve political personal or the States' ADUNs or opposition parties, because Perak's government changes frequently.

Consequently, some respondents had developed a negative perception towards NGOs and the private sectors, and even towards some agencies because of the perceived lack of support and commitment for the betterment of the rural communities. As highlighted by Respondent 13, "Other agencies provide relatively less support as it is likely most agencies still do not know about RCC." This may be due to a lack of promotion. "

Another response from Respondent 8 also suggested that "activities with large NGOs, we are lacking in that aspect." Consequently, these two responses have shown another significant finding, which emphasizes the urgent need for more awareness and promotional programs, as well as marketing programs via technology platform, to ensure the sustainability of the rural economy (Blanchard et al. 2011; Polterovich 2017; Tsai et al. 2016).

4.5.1.2 Decision Making

Tiffen et al. (2014) defined decision-making as the process of selecting decisions based on problem identification, the collection of information, and the evaluation of various solutions. By collecting pertinent information and identifying options, a step-by-step decision-making process might assist one in making a more careful and educated judgment. Therefore, in the context of launching the rural digital economy, decision-making has also become one of the factor determinants. The subsequent subthemes identified were ministry, personal, state, and village.

Under the normal circumstances in the day-to-day running of the RCC, most of the decision-making would come from the chief village, as underscored by Respondent 3, "Decisions related to the program will usually be discussed and decided with the village's chief here." This was also supported by Respondent 4, as stated by him, "We need to discuss this first with the village chief before we proceed." Additionally, Respondent 10 also quoted that: "The last person before we proceed was the village chief. He needs to agree to all the proposals, then we can do the next thing. "

For many of the activities initiated, the village chief needed to decide and confirm all the planned activities to ensure that the programmes were effective and relevant to the rural folks, as well as in accordance with the procedures and objectives. Lestari et al. (2019) in their study argued for the village chief as the best qualified person to decide for the benefit of the rural folks under his purview. As a result, any requirement for any activities for the local community must seek consent and decision from the village chiefs, who were appointed by the local district authority to oversee such decision-making (Mafrizal & Ilyas 2021; Mokolensang et al. 2020; Vollan et al. 2020).

On the other hand, the RCC Manager was also empowered with the authority to decide in his or her own personal capacity, as mandated by the Ministry. This was why "personal" was also identified as one of the subthemes under the decision-making that could initiate the rural digital economy. Since the establishment of RCC, it has been created as a service center for the local rural communities to organise any programs. In many cases, the RCC Manager would be empowered to make such a decision on his or her own, without the intervention of others, especially if such a programme is already on the Ministry's agenda.

As recorded by Respondent 1, "For those small normal activities here in the villages with the village council, we normally decide on our own." Respondent 2 also further supported this notion as quoted herewith, "This decision depends on what we want. For example, if it is a small thing, like the courses, I can do it myself; I do not need to refer to the Ministry. " Lastly, respondent 12 also agreed as well, saying, "If it does not involve something big and it does not involve a big budget, I can make my own decision."

According to Davis et al. (2017), a person in-charge would be most likely to decide personally on the small activities, especially if he or she has already been given the mandate and empowerment to do so, to expedite the program execution (Ramages & Cheung 2018; Supriyadi & Pratiwi 2018). The probability of making the wrong decision on such a matter would not necessarily deter the person in-charge from assuming the full responsibilities of such actions as the possible risk would be minimal and could be mitigated quickly (Anderson-Wurf et al. 2018; Markin & Chefanova 2020; Rizkillah & Simanjuntak 2019; Srour-Alphonse et al. 2020).

On the other hand, since all the RCCs are in the rural areas of Malaysia, the respective state governments would have the authority to decide on certain matters, especially if they are related to the state government agencies. "We will also receive support from state government agencies such as KEJORA (Rural Johor Development Authority)", Respondent 2 says. We also received support and assistance from the Ministry of Rural Development State offices in Johor. " Furthermore, Respondent 6 sought approval from the state government when such a programme would involve other stakeholders, stating, "... if it involves external parties and budgets, we will ask our officer in charge in the federal ministry at Putrajaya and the state office."

Respondent 7 also mentioned similar circumstances, saying, "... but if it is as large as involving other external agencies that want to organise something and want to use RCC, I would propose that they write a letter to the State Ministry." Respondent 9 similarly stated, "If it involves the state, I will refer to the state ministry office." Over there, we have people who are responsible for taking care of the RCC. Any decision involving the name of RCC with agencies or external parties, we will indeed refer to the relevant officials in the

ministry. "

Another sub-theme that had been identified was the decision-making made by the Ministry. Respondent 1 stated, "We will always rely on the Ministry of Rural Development in Putrajaya." This was supported by Respondent 2's quote, "But if it involves external parties and budgets, we will ask our officer in charge in the federal ministry at Putrajaya and the state office." Based on these two answers, it was clear that the RCC managers could not decide on their own, especially if the activities would require an additional larger budget.

By seeking the approval of the ministry, it would provide the opportunity for the rural community to conduct such programmes in the presence of the minister or higher authorities. This was substantiated by the studies conducted by Khan et al. (2015), Rizkillah and Simanjuntak (2019) and Srour-Alphonse et al. (2020), which unequivocally stated that the involvement of the ministry in any such specific program could contribute opportunities and remuneration towards the rural communities, either in terms of facilities improvement or additional budget allocation for the program.

The following Respondents 3, 4, 5, 6, and 7 have also supported those specific programmes or activities which would require additional budget, facilities, and other external parties that would require final decision and intervention directly from the ministry. These are the standard operating procedures that need to be followed since all the RCCs are under the purview of the ministry of rural development. Hence, it is crucial for the person in charge of the RCC to adhere to the procedure to avoid any untoward incidence. Respondent 3 stated,"... but if it is as large as involving other external agencies that want to organise something and want to use RCC, I would suggest that they write a

letter to the State Ministry or the Ministry at Putrajaya."

Additionally, according to Respondent 6, seeking consultation from the ministry would be required to conduct a big event, as quoted by, "I will also consult with the appointed members of this RCC and have a meeting with them to conclude." If it involves something important or involves many parties, we will consult with the state Ministry office or consult with the Economic Community division (who oversees all the nationwide RCCs) in Putrajaya."

4.5.1.3 Geographical Location

This geographical location has also become the subtheme for one of the factors in initiating the rural digital economy for this study. Geography has become one of the factors because the location of the RCC could determine the local rural community's capacity and capability to visit the said RCC for all the activities conducted. According to Respondent 3, "It is hilly and surrounded by jungles..." and also for Respondent 4, "The surrounding area is hilly and near the small town of Bukit Kepong." This serves to indicate that the location of the RCCs could be a factor in ascertaining the effectiveness of the RCCs in propagating the rural digital economy. There were arguments that the technology centre should not be located in the hilly area due to the issues of signal and coverage reachability (Chawhan & Arif Kamal 2021; Drăgulinescu et al. 2021; Myagmardulam et al. 2021; Onitsuka et al. 2013).

In other words, the location of RCC in the village would be a contributing factor towards igniting the rural digital economy. Respondent 1 stated, "It is quite far, but the villagers here frequently go out to Bukit Kepung town for their daily affairs." Hence, there is no problem with them coming to this RCC. This RCC is also located in the Penghulu Mukim Bukit Kepong Complex Area, on the main road from Kampung Tui to Felda Maokil. If you want to go to the nearest town, it will take quite a long time to go to nearby towns such as Pagoh, Segamat, Labis, and Tangkak.

In addition, another respondent 2 was also quoted as saying, "The geographical or topological terrain here is not hilly or forested, just like a typical village on a quiet plateau land." From both responses, it is induced that the geographical location of the RCCs could be a factor in promoting ease of access for the local rural communities as well as providing an opportunity for technology enablers to introduce various innovative internet access for the rural folks to use, thus providing sustainable usage of an online platform to communicate, advertise, create awareness, and submit applications online, which would definitely stimulate the rural digital economy (Ramachandran, Ramalakshmi & Mathankumar 2019; Jimi 2019; Luo & Chea 2018; Subhakala et al. 2017; Thangella et al. 2020).

Therefore, because of the geographical location of some of these RCCs that allowed for internet access, many of the rural folks would come to the RCCs for the internet access that was not made available at their homes. According to Respondent 5, "Actually, it is flat land. The only problem is that my house and my village are further inside the interior. Therefore, there is no wireless internet connectivity coverage signal reaching my house and the surrounding village area. That is why people will still come to the RCC for all matters.

Long-Distance Online Learning is a major issue during the Covid-19 Pandemic, so the children will be unable to do any online learning at their own homes. The RCC has served not only in providing internet access but also the facilities to do so with the personal computers and printers provided. The advent of the Covid-19 Pandemic further exacerbates the situation and underscores the critical issue of having internet connectivity to provide an online platform for the students and a new way of life for the rural communities (Eynon & Malmberg 2021).

Incidentally, the location of the RCCs was designed to be at the commercial centre of the rural communities. The majority of respondents emphasized these in their responses to the questions posed during the interviews. For example, respondent 7 mentioned that "we are in between towns, actually, in between Pagoh, Segamat, and Labis." From Pagoh, it will be about half an hour; from Segamat, about half an hour; and to Labis, about half an hour. " Additionally, Respondent 7 also added that the geographical location of the RCC was "the surrounding area is hilly, and near the small town of Bukit Kepong." On the other hand, another respondent 9 acknowledged the location of her RCC as "Actually, another 10 minutes' drive only to the Thailand border."

Respondent 10 expounded the location of her RCC in kilometres: "The distance from Ipoh is only about 15 to 18 km, and the distance from Gopeng town is only about 1.5 km. This RCC is located within the vicinity of the town, which is on flat land, but no flooding has even been recorded. " This was also further backed by the other respondents (no. 12 and 13, respectively) on the close proximities of their RCCs to the local town. Another respondent 11 had also revealed thoroughly about the location and also the internet connection at his RCC. "Because of the good location of this RCC, which is in between

town and surrounding villages, the internet wireless connectivity coverage is quite good for many of the prevailing mobile internet service providers. Alhamdulillah, there is good Celcom and U-Mobile wireless internet connectivity coverage. But if we go home or further inside into the respective villages, the coverage will be poor and unstable. "

Clearly, the location of the RCC and its proximity to the local town or commercial centre catalysed the capacity of the RCC to provide internet access and serve as the rural hub for the rural folks to congregate. The existence of internet access caused by the geographical location of the RCCs has been proven as a factor and sub-theme for initiating the rural digital economy to improve the rural lifestyle, especially with the advent of the technology evolution under Industrial Revolution 4.0 (Cvar et al. 2020; Komorowski & Stanny 2020; Sulistiyanti et al. 2019).

4.5.1.4 Internet and Digital

When it comes to the internet and digital, there were many studies that deliberated on themes such as trust and security issues, digital literacy, the hardware requirements, the optimum bandwidth speed, the best service provider, and the advantages and disadvantages of using the internet. The Internet and digital represent any kind of communication medium that operates through data encoding in one of the varieties of machine-readable data formats (Korachi & Bounabat 2020). On any digital electronic device, the digital media files can be generated, viewed, distributed, edited, listened to, and archived. Korachi and Bounabat (2020), on the other hand, highlighted the growing concerns about internet security and trust, as well as the quality of the services to be provided by the service provider.

Respondent 1 had recognised the fact of the service provider's commitment to provide for and improve their services. "TM already helps in providing the Internet line connectivity for the Minister's previous event, and the line is still there for use by the RCC and the rural folks here." That's why we will need TM to improve the rural digital and internet connectivity, as I did not see other service providers do so. "Continuous improvement of the internet connection coverage and reachability was very much needed to cater for the onslaught of volume of work since most people are more dependent on online platforms nowadays (Al-Weshah 2013). Orowski et al. (2021) also acknowledged the fact that the internet connection would be a critical element and, as such, would require drastic improvement from the respective service providers to cater for all the market's requirements.

On the other hand, the development of trust among rural people was still low and was still an issue, as quoted from Respondent 2, "... for all the online payments and registration, the rural folks here are still very sceptical about the reliability and trustworthiness of the digital applications and services, much less about the skill sets required to do online banking. Rural folks here still prefer physical commerce transactions in hard cash and personalised services. " The main barrier to improving ICT adoption for any new technology development and application would be to encourage rural people to gain the trust to use it and believe in the benefits and usefulness of the application (Weibel 2003; Bracamonte & Okada 2018; Sharma et al. 2020).

On the subsequent subthemes of the types of internet connection to the respective RCCs, it was recognised that various types of connections were deployed to serve the RCCs, based on the service availability at the time. Previously, direct fibre had a speed of

100 Mbps. Other respondents, such as Respondents 5 and 6, stated, "Yes, it was only a Streamyx internet line with a bandwidth speed of only 1 Mbps." Respondent 10 further added, "Unfortunately, not yet. Our UNIFI Fibre connectivity coverage has yet to reach our RCC and villages. " Respondent 9 also added, "Just the regular internet line. There is no Unifi Fibre here yet. "

All these comments serve to amplify the paradox of providing internet connectivity to the respective RCCs, in which not all are blessed with the best optimum service with high bandwidth speed. It also served to underscore the lack of commitment by many internet service providers to provide the best internet coverage and connectivity to rural folks. To date, the majority of these RCCs have been connected to Telekom Malaysia's internet connectivity, either through the Streamyx Copper line, which provides a narrowband width of 10Mbps and below, or through the much-lauded UNIFI Fiber line, which provides high-speed broadband connectivity with a maximum bandwidth speed of up to 800Mbps. Basically, the rural areas in Malaysia were still facing low or limited internet connectivity, which would be the most critical sub-theme under the factors of initiating the rural digital economy, resulting in low technology adoption among the rural folks (Fitrianti et al. 2021; Bhattacharya & Sachdev 2021; Nabeeh et al. 2019; Riawati 2020).

There were some RCCs fortunate enough to have the UNIFI Fiber line connectivity, as highlighted by Respondent 13. "The internet connectivity is now amazingly fast, ever since we started using UNIFI Fibre High Speed Broadband Internet Connectivity under TM. The Malaysian Ministry of Rural Development will pay for the subscription services every month. All the surrounding villages here also have access to the UNIFI Fibre Internet

High Speed Connectivity coverage. The majority of the households here have UNIFI services in their homes. "

Respondent 12 also noticed an improvement in their internet connection: "We already had UNIFI Fibre Highspeed Broadband connectivity, which was recently upgraded." Respondent 7 added, "the one now is good; no problem even if it rains or thunderstorms, as the internet is still stable. Unlike before, with the copper wire Streamyx line, not only was the internet speed slow, but the internet line would drop out when it rained or thunder stormed. The critical pre-requisite for starting up the rural digital economy would be to have fast, stable, and reliable internet connectivity (Huang 2010; Labovitz et al. 1999).

Other service providers were also commented upon by some of the respondents, as recorded during the interviews. Respondent 8 emphasised the other service provider's service coverage: "Those who have a Streamyx internet line are fine." Kids can still study at home using the Streamyx internet lines, which are slow but better and can be used. Other lines, especially from those wireless internet service providers such as Celcom, are not stable, and the connectivity coverage is bad. Other comments on service providers' coverage of rural areas were also shared by Respondent 11, "The internet connection is not enough." Because we have many computers, and the internet bandwidth speed of 8Mbps is not sufficient to provide internet access to all 18 computers concurrently. The Internet service provider is Telekom Malaysia (TM). I also once tried a Wireless Internet Connectivity Service Provider, CELCOM. "

But Celcom's data is limited to only 50 GB, which is insufficient and can only be used for a month as it has a limited data quota, whereas TM Streamyx Internet line data is unlimited. At least the Streamyx Internet line has unlimited data, hence the data quota will not be necessary to be repeatedly topped up. " The difference in the types of physical internet connectivity was exemplified here, in which only Telekom Malaysia (TM) provided connectivity via fixed line; others, such as Celcom, provided wireless internet connectivity.

Wireless connectivity has been shown to be limited in terms of coverage because it shrinks as more people use it (Braman 2016; Labovitz et al. 1998; Liu et al. 2011). Network congestion is a regular occurrence when more people access the network than the capacity allocated for it. In fact, such network congestion was not only happening on the wireless network configuration, but also on the fixed network, resulting in lagging and network buffering. The more people access the internet network, the more the network needs to have sufficient backhaul and bandwidth speed to support the increased traffic (Jeridi et al. 2021). Bandwidth speed was a critical sub-theme in launching the rural digital economy.

The other sub-theme under the factors of launching the rural digital economy would be digital literacy. According to McDougall et al. (2018), digital literacy refers to an individual's capacity to locate, assess, and effectively transmit information on a variety of digital platforms through typing and other media. Hence, in this context, the researcher acknowledged that the younger generation has more digital literacy as compared to the older generation. Because today's schoolchildren are highly digitally literate and IT savvy.

Additionally, Respondent 5 also deliberated that "Those who come in and can access and use the digital services via the internet connectivity access are those younger generations, below 50 years of age." These younger rural folks have quite good digital literacy. But for those older and elderly, they will definitely ask for our assistance as their digital IT literacy is very poor. Respondent 7 had further informed us that, "In addition, most of the folks here have children working as civil servants or in the nearby Ipoh city."

Therefore, IT or digital literacy is not an issue here. Digital literacy abilities enable you to locate, consume, and generate information online in a productive and helpful manner. Rural people would be able to use technology securely and safely if they were digitally literate (Ajayi et al. 2019). Incidentally, because their level of digital literacy is higher than the rest, the younger generation or rural youth would have the capacity and capability to fully embrace new information technology and related digital services and applications (Vélez et al. 2017).

Consequently, there were two respondents who had recorded comments on fair digital literacy among their rural folks, especially with the older rural folks. Respondent 4 was quoted as saying, "I would say fair. But it very much depends on the type of digital service and the knowledge that they have. " Respondent 8 also acknowledged digital literacy, which was fair amongst the older generation, but the younger generation has a better digital literacy rate and is more adept at dealing with technology.

According to Respondent 8, "If you are asking me about the IT or digital literacy rate in this village area, I think it is about as fair or average as one could expect." Primary school students are likely to have higher levels of digital literacy, likely in the 60–70% range. Because a lot of kids nowadays are mostly using smartphones, many of which are

cheap and affordable. Respondents 2, 3 and 6 emphasised the senior citizens' lower digital literacy. According to them, senior citizens would have poor or lower digital literacy, but they were eager to learn and understand the technology. Respondent 2 stated, "Perhaps for senior citizens or senior age groups, the digital literacy rate is still quite low, as most of them are just learning to use a mobile phone and type."

Respondent 3 emphasised senior citizens' abilities and competencies in using digital technology, saying, "Yes, some of them can use it, but there are many of them who can open the internet to find things, but they have to be monitored and assisted, because many of them don't have the required digital literacy." Respondent 6 had, crucially, proposed a solution to increase rural people's digital literacy. He proposed more programmes that would help to improve the rate of IT digital literacy and the socioeconomic status of rural communities. "With the advent of high-speed internet", he says, "it will help to better support the functions of RCC for the development of rural communities."

Another sub-theme identified under the Internet and Digital sub-topic was the facilities provided in the RCC. The facilities provided under each RCC also played an important role in initiating the rural digital economy. Since the establishment of an RCC would very much depend on the local rural communities, the researcher had asked about the types of hardware provided and accounted for at all the RCCs. Many of the respondents (4, 5, 6, 8, 9, 10, 11, and 12) had given feedback on their RCCs' having computers, printers, scanners, and projectors to be used by the rural folks. For example, according to Respondent 8, "We have 18 computers, as well as some printers as well."

Furthermore, respondent 6 stated that "existing computers are supplied by the Rural Development Ministry; all six units can still be used." Respondent 7 elaborated further on the hardware provided in the RCC, stating, "Yes, currently this is an ongoing process at all RCCs." In addition, RCC also provides services such as scanning, printing, typing, photocopying, rural skills training, ICT and entrepreneurship training, as well as being a registered bank agent for Bank Simpanan Nasional (BSN) for Mobility. One cashless payment for all the bill payments using a bank card. "

Speed, or bandwidth speed, has also been identified as one of the factors in igniting the rural digital economy. The bandwidth speed of the internet connectivity would be vital in ensuring all the work done online was securely and timely completed without any lagging and buffering. The bandwidth speed of the internet connection would require improvement as and when the technology evolves in time with heavier content and applications. In this study, the researcher also asked the respondents about the speed of the internet connectivity at their respective RCCs. According to Respondent 1, "Previously, the direct fibre was at 100 Mbps." Meanwhile, Respondent 2 revealed, "Yes, it was only a Streamyx internet line with a bandwidth speed of only 1 Mbps before that." Respondent 5 also stated, "It has a bandwidth speed of 4 Mbps." Respondent 7, on the other hand, stated that his RCC had a connectivity speed of "only Streamyx line with a bandwidth speed of 8Mbps."

When asked about their experience with internet speed upgrades, Respondent 3 stated, "The one now is good; no problem even if it rains or thunderstorms, as the internet is still stable." Unlike before, with the copper wire Streamyx line, not only was the internet speed slow, but the internet line would drop out when it rained or thunder stormed.

Respondent 6, on the other hand, stated that "both internet wired and wireless coverage connectivity here are good. TM, Maxis, and Celcom are all OK. "

"We already had UNIFI Fibre Highspeed Broadband connectivity and recently upgraded", Respondent 8 said of her internet speed connectivity changes after upgrading. Respondent 4, on the other hand, shared her negative experience with the issue of slow internet speed, which had caused numerous problems, saying, "Yes, the real issue or hindrance is the internet connectivity, the bandwidth speed, as well as the internet line connectivity coverage." which made it much harder to improve digital literacy for the rural folks. "

In addition, the researcher also recognised service providers as another sub-theme that could help facilitate the rural digital economy. As service providers were able to provide good service coverage and internet connectivity, they would be able to generate more activities and transactions within the RCC for the local rural communities, which could generate more revenue for them. According to Respondent 4, such things may not appear as straightforward as she shared, "Quite bad, and many Celcom users here have lodged complaints." This is because the coverage connectivity is not consistent for all these wireless internet service providers. All of them, including UNIFI Mobile, Celcom, and Maxis, which includes UNIFI Mobile, Celcom, and Maxis, which includes UNIFI Mobile, Celcom, and Maxis, which includes UNIFI Mobile, Celcom, and Maxis, which includes UNIFI Mobile, Celcom, and Maxi

Based on her explanation, proactive action was urgently required from the respective service providers to improve their coverage and quality if services to ensure seamless automation and cashless transactions via digital platforms were to be fully

realized as mandated by the government. By taking care of these issues, people in the local rural community would be able to enhance their capabilities and capacities to learn and to adopt information communication technology.

On the other hand, there were some other respondents who were satisfied with the internet service provided. Respondent 5 stated, "Actually, both Internet wired, and wireless coverage connectivity are good here. TM, Maxis, and Celcom are all OK... Other respondents agreed, with Respondent 7 stating, "Alhamdulillah, there is good Celcom and U-Mobile wireless internet connectivity coverage..."Other than that, Respondent 6 had provided a suggestion, an alternative solution, which was, "I had also once tried Wireless Internet Connectivity Service Provider, CELCOM. But Celcom's data is limited to only 50 GB, which is insufficient and can only be used for a month as it has a limited data quota, whereas TM Streamyx Internet line data is unlimited".

Alternately, other respondents, such as respondents 8, 9 and 10, had also shared their bad experiences of dealing with unstable and inconsistent internet connectivity provided by service providers such as Telekom Malaysia, Celcom, Digi, and UMobile. Respondent 8 stated, "Currently, the only available Internet Service Provider for this RCC is Telekom Malaysia (TM)."On the other hand, wireless internet connectivity coverage in this area surrounding the RCC is awful... Respondent 10 also stated, "Here is good coverage from CELCOM. But Digi and Maxis are slow... When people come in with mobile phones, with Digi line, the signal is sometimes OK, sometimes not so. "

Subsequently, the researcher concluded the internet and digital subtheme by also looking at the advantages and disadvantages of having good internet connectivity for rural communities. By understanding these advantages and disadvantages, the respective RCCs

could be better positioned to fully enable the rural digital economy, which would help improve the rural socio-economic situation. Firstly, on the advantages of the internet and digital technology for rural communities, as recognised by Respondent 2, the level of digital literacy among the rural youth was much higher when compared to older folks.

Additionally, Respondent 3 brought up the recent upgrade of the internet connectivity at his RCC, which had given advantages to the surrounding rural community. "The one now is good", he said, "no problem even if it rains or thunderstorms, as the internet is still stable." He also continued to compare the previous internet connectivity, saying, "Unlike before, with the copper wire Streamyx line, not only was the internet speed slow, but the internet line would drop off when it rained, or thunder stormed."

Other respondents seemed satisfied with their respective RCCs' current internet connectivity, as mentioned by Respondent 4, "Those who have a Streamyx internet line are OK." Kids can still study at home using Streamyx internet lines, which, while slow, are better and can be used. This was also admitted by respondents 6 and 7, who mentioned that the internet connectivity was good and all the service providers such as TM, Maxis, and Celcom were providing good internet coverage in their RCCs and surrounding areas.

Respondent 7, on the other hand, added, "Only stormy, bad weather will cause internet connectivity to be intermittently off." Alternatively, respondents 8 and 9 had deliberated about the advantages of using an upgraded internet connection provided by TM. As Respondent 8 stated, "Oh, it's very different. It is super-fast now, not like before, when only one computer could access the internet at a time. Now, all four computers can access the internet simultaneously, and the internet line is still stable and amazingly fast. "

Respondent 9 also stated, "The internet connectivity is now incredibly fast, ever since we started using UNIFI Fibre High Speed Broadband Internet Connectivity under TM. The Malaysian Ministry of Rural Development will pay for the subscription services every month. All the surrounding villages here also have access to the UNIFI Fibre Internet High Speed Connectivity coverage. The majority of the households here have UNIFI services in their homes.

The disadvantages of the internet and digital devices were also being discussed. Some of the respondents highlighted the times when the internet connectivity was not stable or reliable. Respondent 4 stated, "Yes, very much so. All the wireless internet connectivity coverage is not comprehensive, and the line connectivity is not stable either. Respondents 5 and 6 agreed with the statement and emphasized, "Yes, everything is still not improving, and although some have applied to install a new substation, nothing has been installed until now."

Additionally, there were some respondents facing lagging and buffering with their internet connectivity. Respondent 8 responded, "Yes, the real issue or hindrance is internet connectivity, specifically bandwidth speed and internet line connectivity coverage." This makes it much more difficult to improve rural people's digital literacy. Respondent 9 went on to say,"... which is why we only allow half of those computers to be used and connected online to the internet; the other half will not have any internet access capability and will do other types of work that will not involve internet access. Respondent 11 made similar remarks, which he revealed: "Hmmm, that's right. It depends on the situation, but usually when I am the user and other people are also using computers to access the internet line at the same time, the line will just be buffering or loading…"

Some other disadvantages raised by the respondents were the after-sales services and when the internet digital connectivity was downgraded. Respondent 1 stated, "It has been downgraded to 10Mbps, as requested by the Ministry to reduce costs. I have asked TM UNIFI Chat customer service about the availability of UNIFI services, but we still do not have the coverage yet. " Similarly, other respondents also highlighted problems with reporting the poor internet connectivity; there was no fast response or action from the respective service provider. Respondent 2 stated, "Quite true, but TM has recently installed a telecommunication substation and tower for their UNIFI Mobile coverage, so it was OK for a while. Only recently have there been some internet connection problems. I have reported the issue, but there has still been no action yet. "

Finally, respondent 13 stated, "Actually, for your kind information, RCC Sungai Chenaam does not currently have any internet line connectivity." As a matter of fact, as referred to in the Appendix, there were more than 50 RCCs having similar issues of having no internet connectivity. This would further undermine the notion of establishing all these RCCs as technology centres for the local rural communities. Such a problem would further compound the issues of low digital literacy among people in rural areas, as these areas contribute to the widening rural digital divide and exclusion.

4.5.1.5 Function of RCC

The function of the RCC has also been identified as a factor that would contribute to facilitating the rural digital economy. For this RCC function, three major sub-themes were identified for discussion: office, assistance, and visitor. Many responses observed from the transcripts highlighted the importance of the RCC and its functions in assisting the rural communities as a service centre. Respondent 1 basically stated, "In addition, some more improvements are required to ensure this RCC can be of better service to the rural communities here." To accommodate more people, we will need better office supplies and equipment, more computers, and higher bandwidth internet connectivity, such as UNIFI Fiber High-Speed Broadband".

Respondent 3 also stated, "I believe this RCC requires improvement in terms of office supplies and equipment, digital technology services and applications, internet connectivity, and so on." There must be some provisions and programmes on how to implement it. At the same time, RCC needs to have collaboration with government agencies or others. There must be closer collaboration from all the relevant stakeholders to implement those programmes effectively. Respondent 2 also stated, "The RCC building is located in the center of Sg Chenaam village."

On one hand, there is the Farmer's Regional Association Building, and next to it is a kindergarten and nursery under KEMAS (a Federal Agency under the same Ministry of Rural Development); there is also a multipurpose hall. This building is owned by the federal ministry. The land, on the other hand, is under the state government. All of these asserted the relevancy of the RCC as a functional rural service centre for the rural communities.

The above-quoted statements gave credence to the need for the RCC to be established as a proper service centre, fully equipped with office machines and aids, in order to accommodate and provide a professional service for the rural community. It would be to the advantage of the ministry for them to ensure all the RCCs under their purview are fully equipped with good office machines and aid to facilitate all the planned programmes and activities for the rural communities.

In addition to the basic functions of RCC as the One-Stop-Service centre for the rural community, RCC would also serve as the rural commercial hub and training development centre for the rural folks to learn and improve their competencies. With the internet access and facilities such as computers in place, the RCC Manager was able to assist the rural folks with online registration, online payment, and submission of online forms. Respondent 4 stated, "Nowadays, many people come here to fill out school forms, marriage forms, university entrance forms, and so on."

For those studying computers, many people go to the internet centre because they have weekly classes there. Over here, we only provide the basics: how to use the online register and so on; how to do on-line registration and payment; and so on. Respondent 6 also stated, "The need for good, stable connectivity and high-speed internet is very important for the betterment of rural people." This had really benefited them as many had come over to RCC to take advantage of the facilities and services. Hence, to me, as long as the RCC receives visitors and the RCC Manager can provide the services and assistance to the villagers, the Rural Community Centre (RCC) will be a central requirement as a hub for the rural socio-economic improvement program.

Respondent 8 backed this up by saying, "We will also be doing the online registration and application for the pre-school first graders and the school bus application." And today, we have started the MCO 3.0 booth registration, all the via-on-line, SSM renewal, land tax on-line payment, assessment tax on-line payment, and many others that the rural folks may come to us for assistance with. This was further reinforced by both respondents 11 and 12, who had provided similar assistance to the rural folks.

"The special thing we have done for the past 6 to 7 years is the one-stop payment centre for utility bills and online banking with BSN Mobility One, where we can use the card and do not need to use cash at this RCC," Respondent 11 added. "We also provide a hub for local cooking oil collection, and we also have them on sale (1 kg for 1 RM). There are companies that come here for the collection, "Respondent 12 stated," because there are now a lot of applications that need to be submitted online, they will send documents to the RCC, and we will help prepare them. Many of the elderly and old rural folks will need help, as they are not very IT or digitally literate. "

Ever since the advent of the Covid-19 Pandemic, the RCC has also found its own new additional function in disseminating information and updates on Covid-19 status, as well as providing a platform to register rural folks for the vaccination program. Respondent 10 stated, "I have told them to come to RCC for any business and assistance, as I could only help them there with internet connectivity and office wares and equipment availability."

In addition, we are also running a drive campaign for all the rural folks' registration for the Covid-19 Vaccination Program. There are many who, although they have their own smartphone to access the registration via the MySejahtera App, would still prefer to come

here for help to register them. Additionally, Respondent 9 also mentioned helping rural folks use their respective mobile phones to complete their tasks, transactions, and registrations via a mobile online platform. However, during this pandemic time, most of them make do with their own mobile phones by using mobile wireless internet connectivity. But they will still come to RCC here for review and assistance.

This was where the core competencies of the RCC Manager were fully lauded and recognized, as highlighted by Respondent 7. Only then will the RCC remain relevant to the local community in the village. The RCC managers also need to be people who have a high interest in the well-being of the local rural community and are deeply passionate and sincere about helping the villagers. Having a very close relationship with the local village community is a must.

4.5.1.6 Findings' Summary for Research Question 1

A summary of the findings was presented in Figure 4.4 below to show the connection between the factors of initiating the rural digital economy with theme 1.

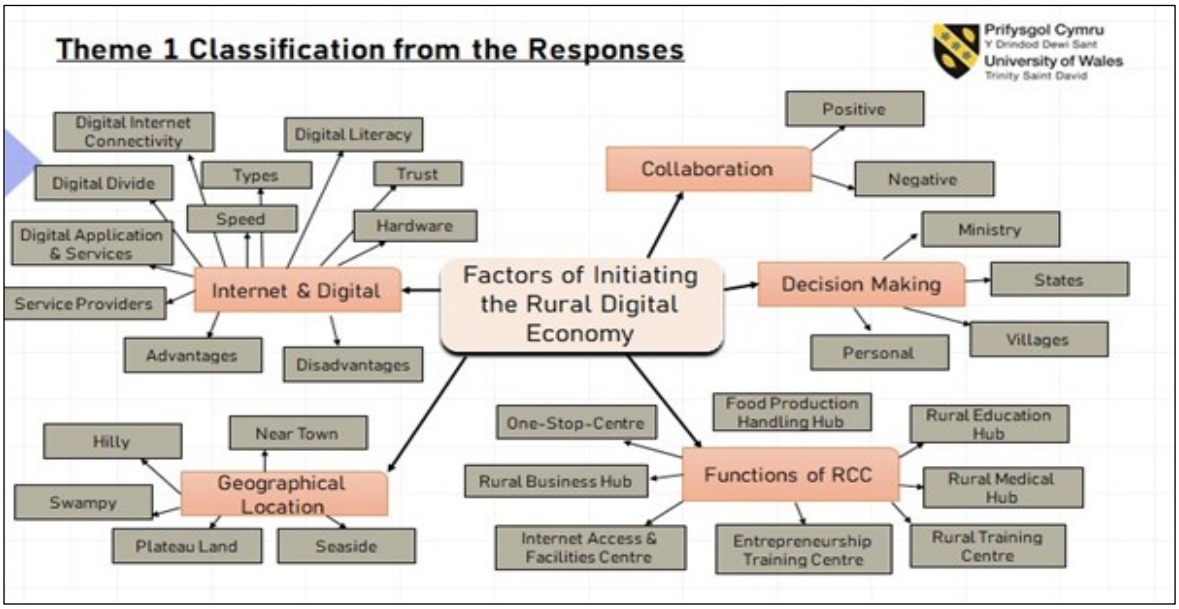

Figure 4.4 Findings of Theme 1

4.5.2 Research Question 2: Discussion on the Impact of Initiating the Rural Digital Economy

This section would use qualitative data from the surveys to discuss the responses to research question 2. New themes arose from the interview snippets, which were presented as well. The findings of the factors in initiating the rural digital economy in Malaysia were presented in order according to the research objectives and the research questions of this study. From the findings, five new sub-themes were created, which were: demographics, effectiveness of RCC, establishment of RCC, ethnicity, and programmes and activities.

4.5.2.1 Demographic

In demographics, there were six new sub-themes created. The six sub-themes were gender, name of RCC, experience, socioeconomics, facilities, and population. From the gender perspective, there was no specific gender recorded in the RCC that always visited. There were three respondents who stated, "Normally, the majority are women." Besides, there were also visitors consisting of kids and children, as mentioned by "Those who frequently come to use the services at RCC are children." And if we conducted some programs, the mothers and adult women were the ones who frequented the RCC. " However, no specific gender was recorded, as Respondent 9 stated, "For the time being, it is difficult to differentiate; both men and women frequently come here and participate in all of the programs."

For the name of RCC, only three respondents revealed the names, which were: Felcra Lubuk Sireh, RCC Layang-Layang, and RCC Sungai Chenaam. On the other hand, the researcher also investigated the RCC manager who had been in experience for more than 5 years. I have been working for 10 years at the Rural Community Centre...", "5 years of working experience...", "13 years of working experience...", and "I have been working since 2013, so coming to 8 years...", as stated by respondents.

Besides, the researcher also investigated the socioeconomic activities practiced among the rural folks in the RCC. Two respondents mentioned that the main activities for them were fishing and farming, while others mentioned agricultural activities and running a small business. "We have more small businesses in the village selling food products such as chips and crackers, workshops, palm plantations, and small retailers," said Respondent 1.

The impact of the rural digital economy can also be seen in the facilities provided, with Respondent 2 stating that "the RCC building is its own building that is equipped with a computer training room, manager room, store, and toilet." Respondent 3, on the other hand, stated, "Yes, this is currently an ongoing process at all RCCs." In addition, RCC also provides services such as scanning, printing, typing, photocopying, rural skills training, ICT and entrepreneurship training, as well as being a registered bank agent for Bank Simpanan Nasional (BSN) for Mobility One cashless payment for all the bills paid using bank cards.

Apart from that, there was one RCC that was located in the complex building that was equipped with proper structure and planning. Respondent 4 stated, "This RCC is in a complex building." Kampung Jelintoh is a new village, well-structured village, with an area

of land allocated specifically for government buildings. So, in terms of location, the RCC is strategically located in a government building complex at the centre of the villages. There is the RCC, the kindergarten, the KEMAS library, and the village townhall, as well as the multipurpose room, the computer lab, complete with the prayer room, the pantry, and the public toilet".

The statement agreed with another respondent 5, who stated, "As a result, the appearance of our RCC is very appealing as it is in a complete government complex. The lobby has displays of the latest bulletin updates for the rural communities to read and follow through. " However, one respondent mentioned the pandemic Covid-19 and stated, "We have asked the customers to wait in the waiting room, as our RCC operation room has limited space, and under the Covid-19 Pandemic SOPs, we must not have too many people congregated in one small, closed space." But then, almost half of the RCCs nationwide do not have any waiting room facilities.

Therefore, some must wait outside under the heat of the sun. "The other facilities provided, such as computers, printers, scanners, and projectors, were also mentioned by most of the respondents. Moreover, the researcher also investigated the population of the village to see how many people the RCC could accommodate for the rural folks surrounding the RCC. Basically, most of the respondents mentioned that the population was more than 400–4000 people. According to Respondent 1, "a good estimate will be of about 1,400 people." Respondent 4 stated that the least populated rural communities in the village were recorded, "For Jelintoh village, the estimated population is about 400 people." RCC's ability to support the demographic profile of the respective rural community was a critical factor in ensuring rural resilience to the proposed transformation (Bock et al. 2013;

Roberts et al. 2017).

4.5.2.2 Effectiveness of the RCC

Basically, the effectiveness of RCC was also identified as one of the impacts of the rural digital economy that can be divided further into two categories: alternative solutions and benefits. For the alternative solution, three respondents mentioned giving free services to the people who come to the RCC. Respondent 1 mentioned, "In my opinion, RCC services should be given for free so that people can always come." Additionally, Respondent 2 also agreed and admitted that the services provided in RCC should be free of any charges as well. Respondent 3 stated that, "To attract more people, we need to give it away for free." People love it when they hear the word "free."

The effectiveness of the RCC would also benefit many people who use it for their daily tasks and activities. According to Respondent 4, "... the effectiveness of the RCC is dependent on the visitors who come to use the services and facilities at the respective RCC, and the respondents are actively involved in the program. Here at RCC, we can help the villagers get the training they need to improve their skills and make more money or find new ways to make money".

Respondent 5 backed up the answer by saying, "The need for good, stable connectivity and high-speed internet is very important for the betterment of rural folks." This had really benefited them as many had come over to RCC to take advantage of the facilities and services. Hence, to me, as long as the RCC receives visitors and the RCC Manager can provide the services and assistance to the villagers, the Rural Community

Centre (RCC) will be a hub for the rural socio-economic improvement program.

Adding to that, respondents 6 and 7 also stressed the advantages of local communities with stable and reliable internet connectivity. By providing a good service powered by good internet connectivity, rural folks would be able to complete their tasks effectively. Respondent 6 stated, "The RCC can provide many benefits to the rural community, as we have internet facilities with computers, particularly catering to those households who cannot afford to have computers at home." We also provide many training developments to improve the competencies and skillsets of the rural folks here; such classes could help to improve the socio-economic status of the rural folks here."

Respondent 7 agreed and added, "In my opinion, if a large number of people come and participate, and a large number of people visit to attend all of the programs organized, those are good indicators of the RCC's effectiveness." There should also be a complete dissemination of information for the knowledge of the public. I also think that we cannot push for the same activities or programs for all the RCCs nationwide because each RCC is very different, depending on the background of the villagers, the socio-economic activities of the village, and the ability of the RCC manager concerned. It is not possible to do all the same for Malaysia. In fact, to ensure the effectiveness of such programs, the chosen programs must truly be relevant and demanded by the local folks.

In addition, the benefits gained by having the RCC set-up in the rural area were not only in mitigating the rural digital divide and economic exclusion, but the RCC also served as a hub for communication to convey public information and create awareness of current events. Respondent 11 stated, "Actually, this RCC is particularly good." The reason is that in today's world, there is a lot of use of information online; the internet facilities that are

available here are particularly important. Many residents from other villages that are far away come here simply because we have the internet facilities that their villages do not have. "Additionally, respondents 8, 9 and 10 also agreed that RCC would help the rural community become more digitally literate and more knowledgeable towards technology usage and adoption. The effectiveness of RCCs is critical to ensuring the successful propagation of the rural digital economy and its impact on rural communities (Chamberlain et al. 2012; Alias et al. 2011).

4.5.2.3 Establishment of RCC

In this context, the establishment of RCC was also discovered in this study as the impact of the rural digital economy on the rural community. Long-term benefits of RCC's establishment include providing a hub for information exchange and knowledge sharing, providing training to improve digital technology literacy, and providing access and facilities for online learning, registration, payment, and document submission. Additionally, most of the respondents mentioned that their RCCs had been operating for more than 10 years. Respondent 9 stated, "It has been ten years since I was the first Rural Community Centre manager to work here."

This was further supplemented by Respondent 11, who also revealed that, "Since 2006, it has been fifteen years with me." The RCCs have been permanent establishments in the rural communities so that they have become part of the rural communities themselves. To ensure success and sustainability, any program or initiative to improve the social-economy of rural communities should begin at the respective RCCs (Alias et al.,

2011; Ashmore et al., 2019).

4.5.2.4 Ethnic

The discovery of the ethnicity profile of the rural communities would be useful to understand the norms, culture, and heritage for the RCC to plan and execute effective programmes and activities to ensure full participation as well as propagate assimilation of the rural communities (Ngah 2014; Noor & Ambali 2014). From the interviews conducted, there were four main ethnic groups reported to have frequented the RCC, which were the Indians, the Indigenous people, the local native Bumiputera (Sabah and Sarawak), the Chinese, and the dominant Malays.

In addition, there were some mixed ethnicities of Thai and Indonesian descent, especially at those RCCs near the bordering countries of Thailand and Indonesia. As highlighted by Respondent 3, "Because here there are housing estates or Taman Perumahan, about 9 of them, we have mixtures of Chinese, Indian, and Malay." Of course, the majority is still Malay, but of Javan ethnicity... Coincidentally, this RCC was located near the area traditionally home to a lot of Indonesian Javanese immigrants. On the other hand, those RCCs located in the rural interiors would have had many Indigenous people who had populated there a long time ago.

As reported by Respondents 1, 2, and 4, this group was one of the many ethnic groups that frequented their RCCs. Respondent 1 clarified, "I have many customers from all ethnic groups here, such as Chinese, Indians, Malays, and Indigenous people." We are not declared as Indigenous areas, but the Indigenous people here have been with other

residents here for a long time.

4.5.2.5 Program and Activity

In the context of the program and activity, there were five sub-themes identified as impact variables, which were: people's involvement, advertisement, fund, disadvantages, and types of programs. The programmes and activities planned for the RCCs were critical to ensuring the rural digital economy's long-term impact on rural socioeconomic improvement (Ashmore, Price, & Deville 2019; Galdeano-Gómez, Aznar-Sánchez & Pérez-Mesa 2011).

If you want to conduct a program to strictly follow Covid-19 Pandemic's Standard Operating Procedures (SOP) to curb the spread of viral infection, the ample space is more than enough to host about 10 to 15 people, says Respondent 1. Before the pandemic, normally the respondents would be about 30 people. The requirements to limit the respondents to maintaining social distance are crucial to ensure all the planned programmes can be completed. We managers have our own laptops. But our projector is broken and needs to be replaced. "

In terms of programmes and activities, Respondent 2 added, "The types of people, or groups, or communities, that come to RCC are very much dependent on the types of programmes conducted." For example, at Bantuan Prihatin Rakyat (BPR) (a government-subsidized fund), mostly women would come because their husbands would be working. For the Vaccination Registration Program, both parents would come along with their children... In addition, Respondent 3 stated, "For the majority of the programs conducted,

it is usually the women who will attend. This was because there was more demand for women's programs. Also, most programs run on weekdays, so it is hard for men to attend."

On the other hand, under the sub-theme of advertisement, respondents 4, 5, and 6 shared their own initiatives and capacities for publishing the programmes of their respective RCCs on social media platforms to create awareness about the program. Respondent 6 stated, for example, "We do have a Facebook Page for RCC Layang-Layang, where we will post all the activities, we do here in our RCC. Due to that, the villagers on the other side will also come to see the performance of these Japanese students while taking pictures.

In the context of the availability of funds to organise the programmes and activities, there were three respondents who mentioned that there was no specific allocation of funds for them to utilize. Some of them had said, "There is no allocation given." However, they had managed to come up with their own initiatives by inviting certain private sectors and volunteer groups to be involved in their planned program, albeit not many were interested or successful. Respondent 11 stated, "Because of a lack of funds, not many programmes can be created. a lot of support from the private sector, especially from those local volunteers from this village. "

It would be highly advisable if some funds were made available for the RCC Managers to enable them to plan and organise many programmes which would benefit and positively impact the rural communities under their respective purview. This was also highly recommended by many academics and industry experts in the studies of rural community hubs in other countries (European Commission, Directorate-General for Agriculture and Rural Development, and European Network for Rural Development 2018; Amirullah 2014; Haenssgen 2018).

Respondent 7 added, "We will also require some funds for us to plan and execute many development programs, which will help the rural folks here to improve their skill-sets, which in turn will help them to generate or find new and additional income-generating opportunities." Respondent 10 also stated,"... the programme we create is a programme that can generate money from respondent fees. We will source a teacher. For example, a course would cost about RM50; the fee will be collected and paid to the teacher. But in my opinion, this method is not helpful. In short, funds should be made available so that the programmes conducted are free of charge for the underprivileged rural folks to attend.

Additionally, despite the good programmes and activities held, there were also disadvantages whereby during the pandemic, there were noted limited programmes and activities that could be allowed. Respondent 4 emphasized, "Yes, correct. Because of this, when we reopen this RCC, many of our activities are limited because the pandemic is still not over yet. Also, as the RCC had already been established as the service hub for the rural communities, there were programmes and activities that needed to be planned and executed for the local rural community.

However, as respondents 1 and 3 mentioned, they are unable to run the programme for free. If there were activities that needed to be run, they opted to charge the fees to the participants to generate some income for the RCC to fund the next programs. The act of charging the fees to the interested participants, as done by Respondents 2 and 5, would pose an added disadvantage as some of the rural folks might not be able to afford the fees, but were inherently the intended participants for the planned programs. As a result, the program we develop can generate revenue from respondent fees. We will source a teacher. For example, a course would cost about RM50; the fee will be collected and paid to the teacher.

But in my opinion, this method is not helpful.

Respondent 5 agreed, saying, "That's right. Not everyone in the village can afford it, and not everyone can afford to join the program. For example, a program may cost up to RM60 for a person to participate. For town folks, this may not pose a problem. But for village and rural folks, while there are some RCCs able to organise programmes that cost only about RM10, rural people may not necessarily come.

In regard to the types of programs, the researcher could identify three main activities that were always being conducted at most of the RCCs, which were the cooking classes, ICT learning, and entrepreneurship classes. According to respondents 6 and 9, the majority of the activities focused on learning new skills for using ICT applications such as Microsoft office wares, online software learning, and others. Respondent 9 mentioned "more like ICT skills, sales, and the sort of things..." Apart from that, the entrepreneurship classes were conducted to teach the local rural communities how to generate income and improve their socio-economic situation.

Respondent 7 said, "It feels the same as my previous answers." The effectiveness of the RCC depends on the visitors who come to use the services and facilities at the respective RCC, and whether the respondents are actively involved in the programme conducted. Here in RCC, we can help to find the training needed by the villagers, which can help to improve their competencies to increase their potential income or identify new potential income streams. " Respondent 12 backed this up, saying, "Most of the programs I do for rural folks are mostly focused on increasing knowledge so that people can do business." Programs that are in high demand are cooking and culinary programs. Most of the respondents came from external districts, such as Kampar and Tapah. We collect

payments because there is no provision given to us. "

Additionally, respondents 10, 11, and 13 further added their cooking classes conducted for their respective local rural communities. Also, Respondent 8 mentioned that his RCC was used as a centre for disseminating knowledge and promoting awareness about the Covid-19 pandemic and its prevention measures. Most of the programs this year are related to the Covid-19 Pandemic prevention, such as hand sanitizers, facial masks, and info pack flyers, he says.

4.5.2.6 Findings' Summary for Research Question 2

A summary of the findings was presented in Figure 4.5 to show the connection between the various sub-themes as discussed and the impact of initiating the rural digital economy under Theme 2.

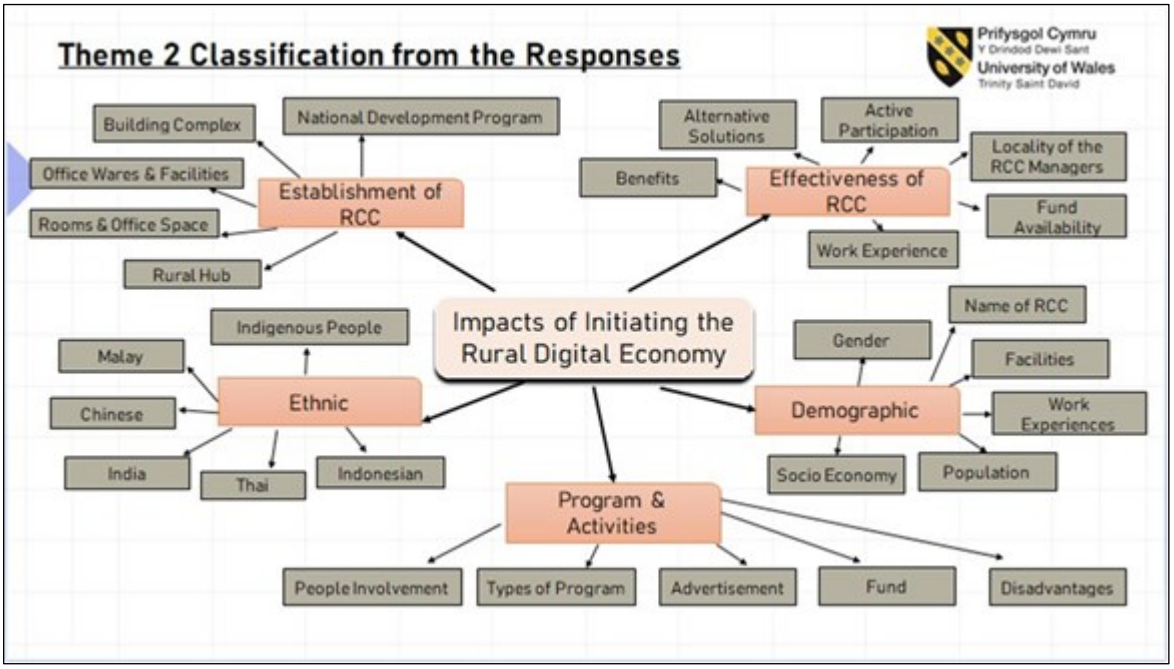

Figure 4.5 Findings of Theme 2

4.5.3 Research Question 3: Relationship Framework Derived

According to the study's findings, there were various components that explain the rural digital economy in Malaysia. Based on the combination of the several themes from the first research question and the second research question that had been discussed above, the following relationship framework was shown as in Figure 4.6.

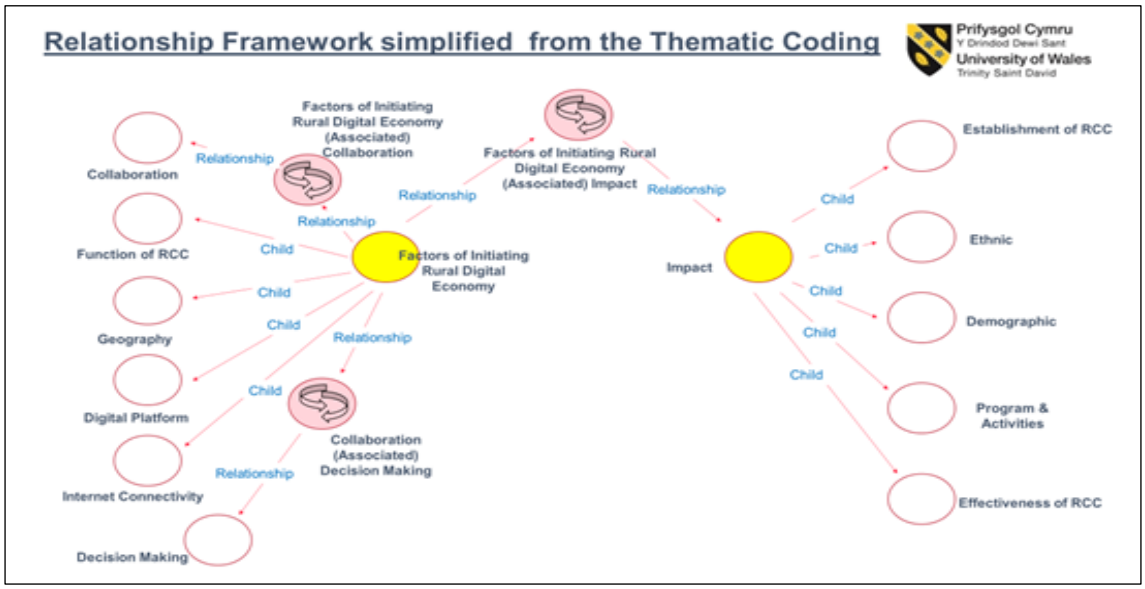

Figure 4.6 Relationship Framework

The findings and discussion of the study have been exhibited from the data that has been collected and evaluated for the factors of launching Malaysia's rural digital economy. As shown, the factors of initiation of the rural digital economy have an associative relationship with the impacts of the rural digital economy. This associative relationship induced both the factors and the impacts to be interdependent and contribute to each other. It was a two-way relationship, unlike a contributing relationship, which would be one way,

a causal and effect relationship.

Under the factors of initiating the rural digital economy, two variables were induced to be associatively related, which were collaboration and decision-making. Almost all the respondents were quoted as saying that collaboration and participation from the private sectors and NGOs, which were critical as the RCCs would have the funds and resources to conduct meaningful programmes, would have to be decided upon by the federal ministry of rural development. This further strengthens the argument that for a sustainable programme at all the RCCs, the Ministry should be the initiator and the driver to facilitate the collaboration and partnership programme with all the private sectors and industry experts. This Smart Village Enablement Program would be a good example, and could be a success story if it was continued by the government of the day.

4.5.3.1 Proposed Framework for The Rural Digital Hub

To address these issues, digital technology could provide new ways for the rural populations to access services, as well as new opportunities for the rural companies and the transportation networks to develop better social and economic ties. However, due to the lack of internet connectivity, the rural folks' ability to take advantage of these opportunities was still very much impeded. The internet is becoming more and more important in everyday life, and many services, such as lifestyle, finance, healthcare, education, and business, would not be available without it.

Rural communities would need broadband as much, if not more, than their urban counterparts. Despite this, evidence shows that most people who don't have internet access live in rural areas. This was a concern not only in terms of service availability, but also for those who wanted to establish their own enterprises or work from home. People who did not have access to broadband were becoming increasingly disenfranchised as government services moved online. Rural areas with better connectivity might be more appealing places to live and work than those without, which would promote social and environmental sustainability.

In order to compete in the larger economy, broadband will be increasingly critical for many enterprises. Figure 4.7 shows the proposed relationship framework for a "smart village enablement" program. It shows the factors that could help start the rural digital economy, as well as the possible effects they could have.

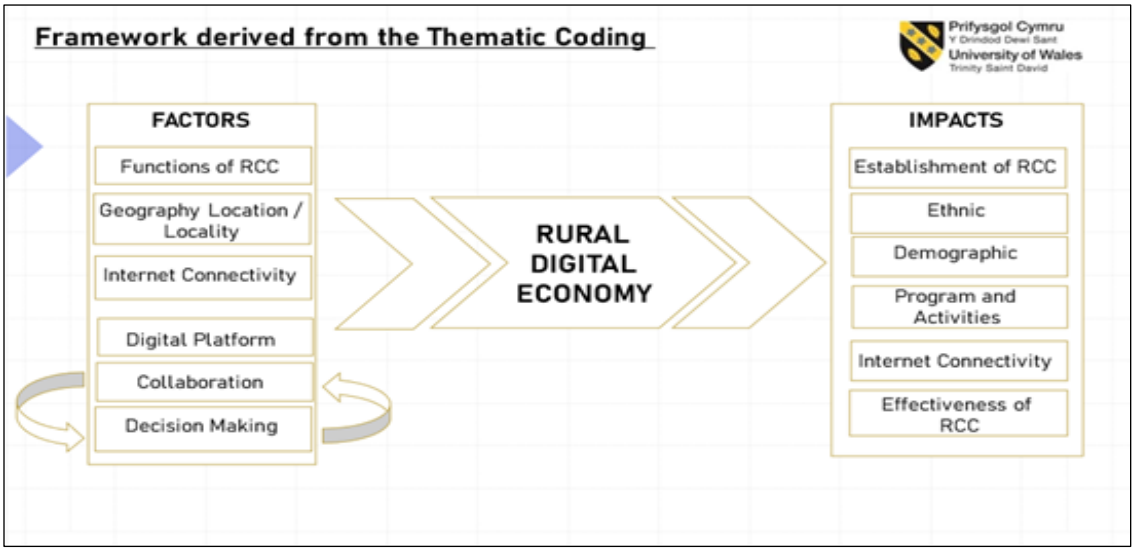

Figure 4.7 The Proposed Relationship Framework for the Rural Digital Smart Village Enablement Program

By referring to the findings of this study, 6 factors have been identified to influence the start-up of Malaysia's rural digital economy. In other word, the government has to ensure the existence of these factors in realising the establishment of the rural digital economy. The first factor is the function of RCC. The findings from the respondents confirmed the function of the RCC as a one-stop-service centre for the rural communities. The RCC also functions as the food production hub for the rural cottage industry, the rural education hub in providing training and development for the rural folks, the rural business hub for the rural entrepreneurs, and the rural medical hub for those areas in which medical facilities are not co-located with the RCCs. It also provides internet access and facilities for rural residents to use for online registration, payment, and document submission.

The RCC could improve their service to the rural populations in the area. To accommodate more people coming in, better office machines and equipment, with more computers, and higher bandwidth internet connectivity, such as UNIFI Fiber High-Speed Broadband, were needed. Additionally, the RCC would also need to upgrade its office machines and equipment, as well as create new innovative digital technology services and applications specially tailored for rural folks. In order to effectively implement those plans, there must be some provisions and programs in place, as well as closer coordination among all essential stakeholders.

The RCC Manager would be able to provide better services and assistance to the villagers, and the Rural Community Centre (RCC) should be transformed into a Rural Digital Hub to catalyse the propagation of the Rural Digital Economy. The appointed RCC managers should be very passionate and deeply motivated to facilitate the improvement and well-being of the local rural community.

The second factor is geographical location. The RCCs selected were found to be located in this topological area, such as hilly, swampy, seaside, plateau, flat land, and very near to big towns. In fact, most of the 191 RCCs could be categorically located within these types of topological areas. These types of topological areas would serve as sub-themes for one of the factors in initiating the rural digital economy. The geographical locations of these RCCs would determine the types of technology required for internet connectivity and coverage, and also whether the current connectivity under the current technology would be sufficient or not to rejuvenate the rural digital economy for the respective RCCs and the rural folks.

The third and fourth factors are internet connectivity and the digital platform. Common findings under these internet and digital categories were coded as trust, types, literacy, hardware, speed, service provider, advantages, and disadvantages. Trust is an important property, and incidentally, many respondents have been putting trust in Telekom Malaysia (TM) to come through with providing digital internet connectivity for the RCCs and rural areas. However, many rural folks were still very sceptical about the reliability and trustworthiness of digital applications and services.

In terms of types of services, all respondents were waiting with eagerness for UNIFI Fiber Internet Connectivity to reach the vicinity of their respective RCCs and villages. All agreed that the current types of internet connectivity via Streamyx copper line as well as wireless internet connectivity were not stable and reliable. In terms of digital literacy, most of the respondents agreed that the digital literacy for many of the rural folks was still low and that more programmes needed to be created and organised to improve the digital literacy of the villages.

For all the RCCs, the hardware of office machines, computers, and other aids seemed adequate for the usage by the rural folks, for the moment. This office equipment and hardware were sufficient for the RCCs to organize rural skills training, ICT, and entrepreneurship training. Only the issues around the required bandwidth speed were still lacking for those running on TM's Streamyx internet connectivity as well as other mobile operators on their wireless network connectivity. The preferred bandwidth speed would be that of the TM's UNIFI Fiber connectivity, and hence, the preferred service provider for many of the RCC Managers. All of the above would provide for the advantages and disadvantages of the Internet and Digital sub-theme, as to which service providers would have the advantages in servicing the RCCs, as well as which of the types of internet connectivity would have advantages or disadvantages in providing better coverage with respect to the geographical location of the RCCs.

The fifth factor is collaboration. 61.5% of the respondents interviewed had highlighted negative collaboration sentiments. Negative collaboration was meant by the lack of collaboration happening in the RCC between government agencies and private sectors with non-government-organizations (NGOs). Some of the reasons were the change in the government of the day, a lack of awareness from the private sector and a lack of support from the ministry and state agencies. The lack of support from the ministry was due to the lack of sustainable programmes with enough commitment from the government of the day.

In addition, most of the agencies still did not know about the respective RCCs, resulting in some of the agencies' being non-committal in their support. Hence, most of the programmes conducted at the RCCs were due to the proactiveness of the respective RCC

managers, with support and help from the respective village councils and the rural folks themselves. There were some RCCs that had positive collaboration, as stated by some of the respective respondents, having good participants and collaboration from the related government agencies as well as the local NGOs and private sector, but this was not consistently driven throughout the other RCCs nationwide.

The sixth factor is the decision-making. There were four additional sub-themes found under the decision-making, which were villages, personal, state, and ministry. In other words, the decision-making was sub-divided into 4 levels: self-made decisions by the RCC Manager, the village council, the state agency, and the federal ministry. Therefore, as shared by many of the respondents, for most of the decision-making, the respondent would discuss with the village's chief for feedback and endorsement before commencing. On the other hand, for small day-to-day operational things, the respondents would decide in their own personal capacity.

Most of those decisions would not incur additional high budgets or involve external parties and would be within the RCC Managers' mandates from the Rural Development Ministry. Respondents believed that if decisions were made quickly, the work would also commence quickly without much due diligence. Otherwise, the respondents would need to inform the state agencies if they would incur some additional resources and support from them. This is because they feel safer if external parties are involved in RCC. On that aspect, any involvement from other external parties and involving additional resources and budgets would require the ministry to be engaged and consult for decision-making.

Under the impact of initiating the rural digital economy, there were five sub-themes discovered, which were: the demographic, the effectiveness of RCC, the programme and activities, and the ethnic. Basically, these were the five sub-themes predicted to be most impacted by initiating the rural digital economy for the rural communities. According to Despotovi et al. (2020), demographics were important because they would give a comprehensive overview of a population's many traits.

Corporations and other private-sector firms would also utilise demographic data to have a better knowledge of their customers for them to build a strategic business and marketing strategy appropriately. The findings obtained in this study were also supported by other academics, who further suggested that demographics and their statistical implications were crucial for giving better insights into population profiling (Marioara & Armanca 2020; Philip & Williams 2019; Podgórniak-Krzykacz et al. 2020; Risti & Bokovi 2020).

Most of the people who frequented the RCC were women and children. Most of the respondents mentioned that for all the conducted programs, it was always the mothers and housewives who would participate. They would be able to make the necessary changes to improve their capabilities, competencies, and confidence if they were given the necessary tools (Angelucci & Heath 2020; Junaid et al. 2020; Mat & Razak 2011; Tunin & Gouvêa 2020).

All the selected respondents had more than 5 years of work experience, which showed that all these RCC Managers would have ample experience to man their respective RCCs. Population-wise, the average population was about 1,000 people for most of the RCCs selected, with the least populated at RCC Jelintoh. In terms of socio-economic

activities, most of the rural communities were found to be active in agricultural activities, fisheries, and small rural cottage businesses, mostly in food production. All the selected RCCs were fully equipped with basic facilities, having their own building and equipped with computer training rooms, manager rooms, stores, and toilet facilities.

The other sub-themes under the effectiveness of RCC were alternative solutions and benefits. As quoted by many of the respondents, due to the lack of funds at their disposal, the RCC managers took it upon themselves to find alternative solutions to conduct the various programmes at their RCCs. The most obvious ones were looking for private sector and NGO partnerships. But as many have highlighted, the participation from the private sector was not very encouraging. The other, more popular, alternate solution was to charge some fees to the participants to at least cover the cost of organizing the program.

According to Rampun et al. (2020), measuring the programme impact and benefits against the cost will promote effectiveness and ensure commitment from the participants. The effectiveness of the programmes conducted would have a long-term benefit for the rural folks who paid to participate, as they would be more committed to the learning process and the knowledge provided for, if compared to those who attended the programmes at no charge (Li et al. 2014; Oktaviani et al. 2019; Zulvia 2017). The third sub-theme, the establishment of RCC, was very much proven, especially since all of the selected RCCs had been in the rural communities for a long time and had been part of their daily routine lives.

Lastly, for the programs and activities, the five variables impacting the rural digital economy were: people's involvement, advertisements, funds, disadvantages, and types of programs. For people involvement, most respondents complained about the dwindling

numbers of people frequenting the RCCs due to the Covid-19 pandemic. Many have said that before the pandemic, the participants of any program conducted could easily reach about 30 people. Due to the current situation, the Covid-19 pandemic has become a barrier to many programs and activities (Chapman et al. 2021; Hanke et al. 2020).

In addition, for most of the programs conducted, the highest participation would be from the women's groups, housewives, and entrepreneurs. Most men were not able to attend due to work commitments or were just plain disinterested in coming. Social media platforms such as Facebook Pages and Instagram were widely used for advertising and promotion to post all updates and future programmes at the respective RCCs. In terms of funds, almost all respondents complained about the lack of funding to create more programs. The hope was for more participation from the private sector and non-governmental organisations (NGOs) in the form of partnerships or collaboration.

Lastly, in terms of the types of programs, almost all the RCCs would organize cooking and culinary programs because of the popular demand from local rural folks, mostly from the women who most frequently frequented the RCCs. However, the RCCs also conducted other programs, such as the agricultural activities and the Covid-19 registration and vaccination program, which are currently the most pertinent and relevant.

4.6 Conclusion

This chapter discusses the study's findings and conclusions in order to describe the evolution of Malaysia's rural digital economy. The names of the total of 13 respondents used in discussing the outcomes of this study were pseudonyms, not real names, as promised to all respondents during the data gathering process. This was done in order to protect the respondent's personal information. This chapter also presents the thematic analysis that represents the respondents' feedback. The following chapter discussed this feedback.

CHAPTER FIVE
IMPLICATIONS, RECOMMENDATIONS, & CONCLUSION

5.1 Introduction

This chapter concludes the study with the situational background and the problem statement. These give rise to the objectives of the undertaken research and whether these research objectives have been achieved. The findings were further discussed in terms of their theoretical and business implications. The chapter highlights the limitations of the undertaken research and recommends further future potential studies to fill in the gaps.

5.2 Recapitulation of the Study

There were many instances in various countries and continents where the Smart Village Conceptual Program was developed and deployed with the full backing of the government through funding and policy. The European Union, under the European Network for Rural Development (ENRD), has undertaken various Smart Villages conceptual initiatives to stimulate the rural digital economy as well as green energy in Eastern Europe, as well as in Germany and France (ENRD 2017b; European Commission, Directorate-General for Agriculture and Rural Development, and European Network for Rural Development 2018; Feldmann 2018). Arguably, it was in India that the Smart Village term was coined, with the proposed ecosystem and initiatives developed in many areas of its rural province (Holmes 2017; Prakash, Poul & Nilesh 2017; Indira & Anupama 2016).

Similarly, Indonesia has launched its own version of the Rural Smart Village programme to spread rural digital in order to improve the socioeconomic status of rural residents (Hadi 2018; Fahmi & Sari 2020; Kamarudin, Untari, & Ngah 2018). There have been initiatives similar to the Smart Village Program undertaken in African countries, all with the goal of improving the socio-economic conditions of rural people by improving digital internet connectivity in their rural areas (Madzima & Nhamu 2010; Phahlamohlaka et al. 2014; Atieno 2014; ITU 2019).

It was known that by enabling internet digital connectivity and improving penetration and reachability, an economic uplift would be observed through incremental GDP improvement (World Bank 2016b). This was made abundantly clear when China was able to significantly increase its national GDP and become one of the world's economic powerhouses through its rural digital economic exploits and drives (Oreglia, Liu, & Zhao 2011; Yu 2018; Xia 2018).

In its 2018 report, the World Bank came up with recommendations for Malaysia on improving its GDP through digital economic propagation programmes (World Bank Group 2018a). The report strongly recommended Malaysia undertakes many initiatives and programs geared towards driving the digital transformation of many of its businesses as well as ecosystems in order to achieve the status of a high-income nation, a necessary direction towards becoming a developed country (World Bank Group 2018b). However, in order for Malaysia to achieve this, the country must seriously address the widening rural digital divide and economic exclusion that are afflicting rural communities.

Realizing this, the Malaysian Rural Development Ministry has undertaken various rural development programmes to improve the socio-economic conditions of the rural communities and bring them into the mainstream to embrace the Industry 4.0 Digital Revolution. One of which would be the Rural Digital Smart Village Enablement Program (Syed Ismail 2018; Heng 2020; Mohd Noor, Hashim, & Md. Jamin 2020; The Malaysian Reserve 2019).

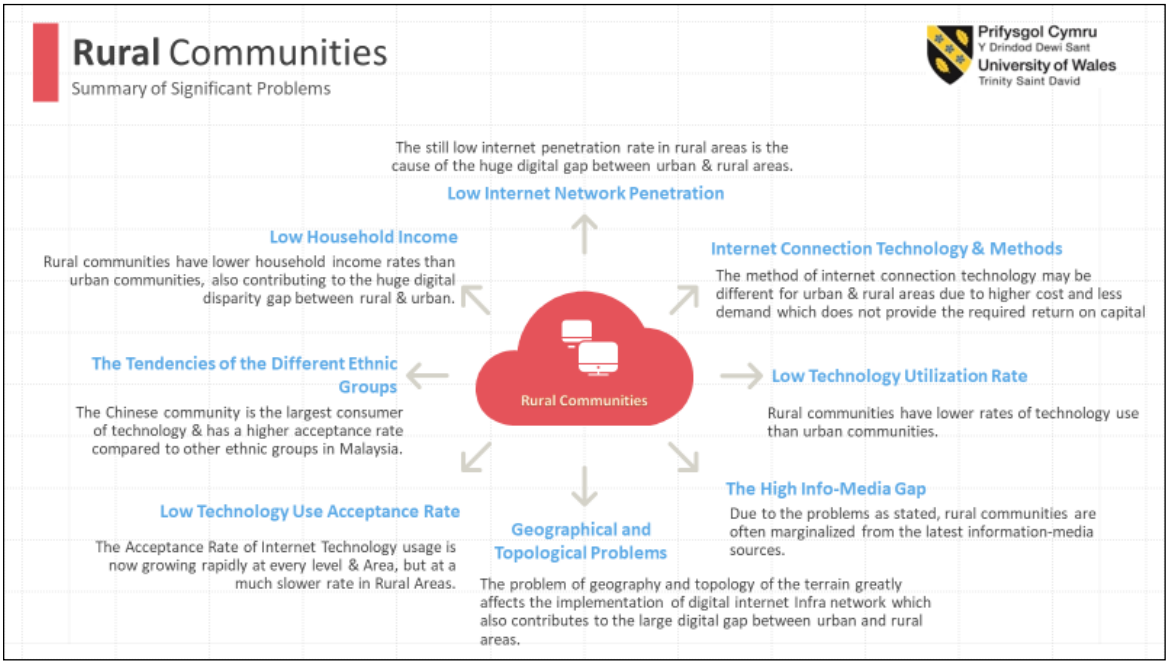

Figure 5.1 Summary of Significant Problems Plaguing the Malaysian Rural Communities

The aim of the research was to study the development of the Rural Digital Hubs from the prevailing Rural Community Centres (RCC) through the Smart Village Enablement Program. These Rural Digital Hubs would serve to propagate the Rural Digital Economy, which would be instrumental in improving the social-economy of the rural communities (Chamberlain et al. 2012; Philip et al. 2015). Inadvertently, the RCC

transformation into the Rural Digital Hubs would help to alleviate most, if not all, of the protracted issues and significant problems plaguing the rural communities in Malaysia, as listed out in Figure 5.1. All these significant problems would be clustered into themes and coding, for example, either under "Rural Digital Divide" or "Inclusion," as later identified during the data analysis and findings, with identifiable relationships and attributes as the antecedents or consequences of the Rural Digital Economy.

The “hard” aspect of the situational issues would be the Rural Digital Divide, as denoted by the lack of digital connectivity and internet coverage, as well as on office wares and devices (Philip et al. 2017a; Feldmann 2018; Erdiaw-Kwasie & Alam 2016). Rural digital inclusion or exclusion, on the other hand, would be the "soft" aspect of the situational issues, as depicted by low digital literacy, the affordability of rural digital services, and others involving the rural community's adoption and resilience to digital technology and services (Correa & Pavez 2016; Haenssgen 2018).

Henceforth, the study being undertaken would be looking at these three research objectives. The first objective is to identify the determinants of the initiation of the rural digital economy in Malaysia, and the second objective is to analyse the impact of initiating the rural digital economy in Malaysia. The third objective is to recommend the framework for the Smart Village Enablement Program in initiating the Rural Digital Economy in Malaysia.

In Chapter 4, the detailed discussion of the findings showed that the above-mentioned objectives were successfully met. From the data collected via personal interviews with the selected rural community managers, further analysis was conducted via the NVivo system. The interview transcriptions were uploaded into the NVivo system for

thematic and coding analysis, as prescribed by Hutchison, Johnston, and Breckon (2010) and Mohd Tobi (2019). From the coding analysis, some emerging themes were observed, and further query tools as provided by the NVivo system produced a relationship framework, relating the determinant factors for kicking off the Rural Digital Economy to the perceived and potential impacts of its implementation. This chapter would be devoted to deliberating on the implications of this study in terms of its theoretical and business aspects.

5.3 Summary of the Findings

The identified determinant factors in initiating the rural digital economy and its perceived potential impacts were shown in the proposed relationship framework for a smart village enablement programme, as depicted in Figure 4.7 in the last chapter. There were six identified determinant factors. The first factor is that collaboration between the public and private sectors would help to maintain the RCC's relevance and provide services to rural residents. The second factor is the function of the rural community centres (RCC), which would be to serve the rural communities and act as a meeting point and incubation hub for rural entrepreneurs. In other words, the current basic functions of the RCC would need to be transformed into those of the Rural Digital Hub.

Besides, the geographical location of the RCC, which is to be located at the centre of the surrounding villages with the relevant government offices and a nearby commercial centre, is also considered the third factor. Then, the fourth and fifth factors are the digital platform requirements required for the existence of any digital service or ecosystem and

the internet connectivity requirements that become the ultimate pre-requisite for all of the above to occur. The final factor is that the RCC Managers from the Federal Ministry offices were empowered to decide on the type of programmes and collaborations which were relevant to the locality of the rural communities.

In conjunction, there were five perceived potential drivers of the impact of commencing the rural digital economy. The first driver is that the establishment of the RCC would provide rural people with the leverage they require to cater to their needs and provide relevant services. The second driver is that the ethnic integration of the rural communities would be greatly enhanced as the communities would be integrated towards achieving the same goals, which would be their socio-economic betterment. The third driver is that the demographic assimilation of rural communities would be greatly improved if the rural digital economy were successful in creating new opportunities such as jobs and new businesses.

The fourth driver is that sustainable programmes and activities are designed to be specifically relevant to the socio-economic activities of rural communities to provide them with value-added knowledge, new capabilities, competencies, and capacities to improve their rural livelihoods. The fifth driver is that the effectiveness of the RCC would be determined by the rural people's active participation, and inclusion into the mainstream would be made possible through their digital literacy and socioeconomic improvement.

5.4 Implications of the Study

The aftermath of the study would give rise to the notion that rural digital economy propagation would be the best way to help improve the socio-economic conditions of Malaysian rural communities. The Smart Village Enablement Program was started by the previous government immediately after the 14th General Election, which was considered a watershed moment in Malaysian politics, as it was the first time, a change of government had taken place. Unfortunately, this change would not last, as the political scenario was too volatile with too much in-fighting, which resulted in another change of government; a new political affiliation with the previous regime coming back into power.

With the changes in the government, the ministries would be changed as well, resulting in the Smart Village Enablement Program, spearheaded by the previous government, being put on the backburner, unfortunately. Nevertheless, since the subject matter was truly relevant under the purview of the Rural Development Ministry, the government officers in charge of the rural communities had given their consent for the research to proceed. In other words, the theoretical and practical business implications of the research were very much apparent, as elaborated hereafter.

5.4.1 Theoretical Implication

Prior to this study, a number of studies on Malaysia's Rural Internet Center had been undertaken. However, there was little room for those researchers to connect the centre to the internet. They withheld a lot of information regarding the digital ecosystem and platform that would be used to create the necessary digital services and applications for rural areas in order to get ready for the future Industry 4.0 Digital Revolution. Additionally, a lot of other studies would concentrate more on the rural development initiatives than on the information and communication technology needs to support the deployment of those programmes.

In order to address the social, economic, and political aspects of the individual rural areas, Shahriar et al. (2014) advocated that the Rural Transformation Centre (RTC)—the former name for the RCC—be established. The intention was to fortify rural Malay communities in order to make them closer and more reliable political bases for the previous administration (Shahriar et al. 2014b; Ngah 2009). The goals of the Malaysian rural development programme (Ngah, 2009; Elhadary, & Samat, 2015) were to end poverty and give rural areas the basic infrastructure they needed for amenities (Ngah, 2009; Elhadary, & Samat, 2015).

Additionally, one of the objectives of those rural development programmes was to supply the aforementioned rural settlements with enough food and resources, as well as a surplus to serve the remainder (Imang & Ngah 2010). This would be a component of the urban-linkage system to expand economic opportunity in rural areas (Ngah, Kamarudin, & Saad, 2016). In this manner, rural development programmes of the time were primarily

concentrated on essential infrastructure projects for rural and isolated areas, such as roads, water, and electricity (Preston & Ngah, 2010; Ngah, 2012b).

Therefore, compared to neighbouring countries in the region approximately 10 years ago, Malaysia has made significant progress in opening up the rural areas to the mainstream of economics via roads and infrastructure (Ngah 2009, 2015b). However, many researchers realised at the end of the study that the problems of the digital divide and rural exclusion were a direct result of a lack of rural digital access (Alias et al. 2011a; Syed Ismail 2018; Shahriar et al. 2014b; Razak, Malik, & Saeed 2013; Malek et al. 2012; Genus & Nor 2007).

Alias et al. (2011) presented the theories of change in their study on the development of the Malaysian Internet Rural Centers. Additionally, in their assessment of a Smart Village Conceptual Program for the rural community in Kampung Besting, in the northern regions of Malaysia, Razak, Malik, and Saeed (2013) outlined the necessity of ICT enablement. For any rural community to achieve digital inclusion, Malek et al. (2012) presented the "Digital Inclusion Theory," an adaptation of Maslow's Theory of Hierarchical Needs, with five degrees of digital inclusion to be attained.

By converting the current rural community centres (RCC) into rural digital hubs to promote rural digital inclusion and lessen the rural digital divide that affects rural Malaysians, this study seeks to supplement the works of the aforementioned academics. This study would act as a link between providing the digital connectivity and ecosystem platform of the contemporary rural development programmes with those of the prior ones and further sustain those programmes for the socio-economic improvement of the rural people by outlining the determining factors to initiate the propagation of the rural digital

hubs and how these would stimulate the rural digital economic agenda under the Smart Village Enablement Program. Up to this point, no framework has been put forth by other academics for a programme to enable rural digital smart villages, particularly in the context of rural development in Malaysia.

5.4.2 Business Implication

The practical application of this framework to stimulate the rural digital development of the rural community centre was quite apparent. For the Ministry of Rural Development, the Rural Digital Smart Village Enablement Program would help the rural communities in three ways. First is by alleviating the digital divide plaguing rural communities. The second is by boosting the competencies, capacities, and capabilities of rural communities. Third, as a digital platform, it can be used to introduce new income generation opportunities for rural communities.

Benchmarking the successful rural digital economy propagation in Taobao Village in China, the Malaysian Ministry of Rural Development in 2019 embarked on its version of the Rural Digital Smart Village Enablement Program, supported by Telekom Malaysia (TM) and selected industry and private sectors. A Proof of Concept (POC) was implemented in one of the rural community centres at Kompleks Penghulu Bukit Kepong, Pagoh, Johor. The location was selected personally by the then Minister of Rural Development, Datuk Seri Rina Mohd Harun, as per her letter to the TM Top Management, as attached in Appendix 20.

The intention was to transform the RCC Kompleks Bukit Kepong into a Rural Digital Hub to stimulate Rural Digital Propagation, with the hope of improving the socio-economic conditions of the rural communities. The aim of the POC was to showcase the transformation of a rural community centre into a rural digital hub, powered by high-speed internet connectivity and supported by a digital platform, complete with rural digital services and applications, which were perceived as relevant for the local rural communities of the villages surrounding the RCC Kompleks Penghulu, Bukit Kepong, Pagoh, Johor. That transformation road map was as depicted in Figure 5.2, which was presented by TM to the Ministry of Rural Development, which subsequently resulted in the Proof of Concept (POC) project at the said RCC.

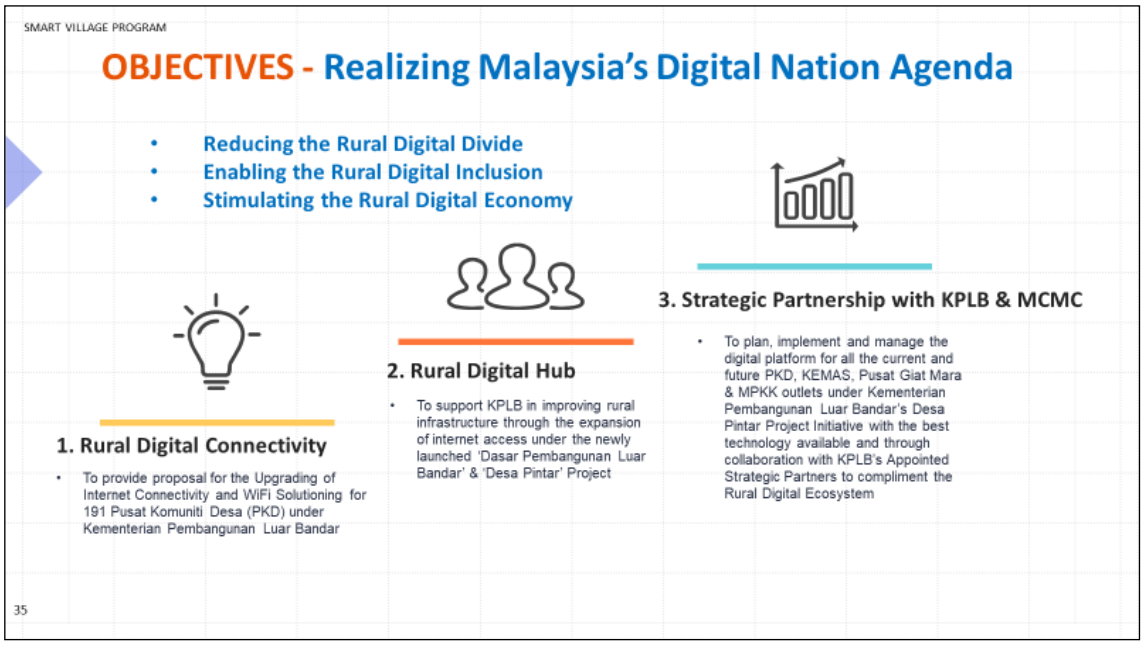

Figure 5.2 Telekom Malaysia's Proposal to the Malaysian Ministry of Rural Development on the Smart Village Proposition Conception

Source: Ghaffar (2019)

TM was tasked with providing high-speed digital internet connectivity to the RCC as well as to the surrounding villages via fibre optic and wireless 5G radio coverage. The proposal was for TM to tap into the Universal Service Provisioning fund from the Malaysian Communication Multimedia Commission (MCMC) for the National Fiberization Connectivity Plan (NFCP) and the national roll-out of 5G Mobility, which are under the overall JENDELA Program (MCMC 2020a). The proposed network to power the Rural Digital Hub while providing digital connectivity to the surrounding villages is illustrated in Figure 5.3.

Once the high-speed digital connectivity was in place, only then could the digital platform be set-up, with the subsequent digital eco-system building blocks, to complete the Smart Village Digital Eco-system, as illustrated in Figure 5.4. This is where the ministry would invite many industry players from the private sector to collaborate and co-create the relevant digital services and applications for rural services and digital lifestyles. For example, the Malaysian Digital Economic Corporation (MDEC) was expected to spearhead the digital platform and eco-system requirements under the Malaysian Digital Economy Blueprint (Malaymail 2020; MDEC 2019; Jun 2021; Economic Planning Unit 2021).

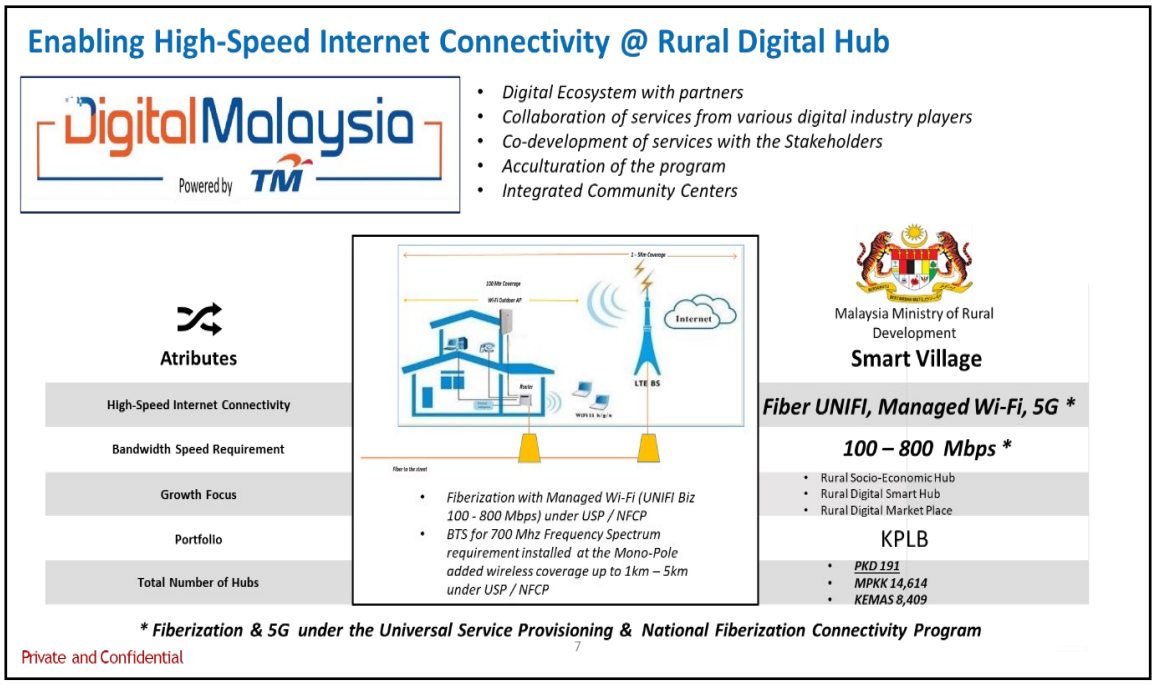

Figure 5.3 Telekom Malaysia's Digital Malaysia Initiative in Enabling the High-Speed Internet Connectivity @ the Rural Digital Hub

Source: Ghaffar (2019)

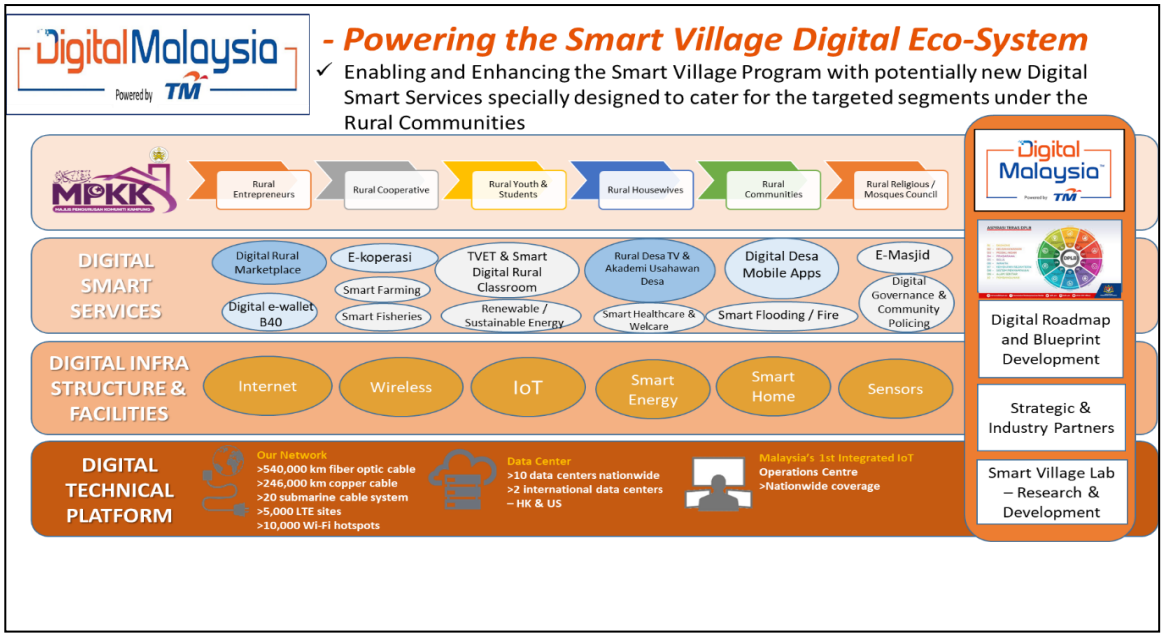

Figure 5.4 Telekom Malaysia's Digital Malaysia Initiative in Powering the Smart Village Digital Eco-System

Source: Ghaffar (2019)

A detailed report of the Proof of Concept (POC) at the RCC Kompleks Penghulu, Bukit Kepong, Pagoh, Johor could be referred to further in Appendix 4. Based on the POC, a pre-test was conducted during the many engagement sessions with the RCC Manager there, as well as in the rural communities, which formed the basis for the interview protocol to be used when actual interviews and data collection were conducted with the selected RCC Managers. The subsequent translated transcriptions from those interviews collected were uploaded into NVivo for further data analysis and thematic coding, as detailed in the previous chapter.

The resultant relationship framework, as shown in Figure 4.7 in the last chapter, was useful to describe the theoretical implications and contributions to the field of work on the Rural Digital Smart Village Enablement Program. However, for the business practical application, it would be recommended for that relationship framework to be modified and arranged as the proposed framework for the rural digital hub development and deployment, as demonstrated in Figure 5.5.

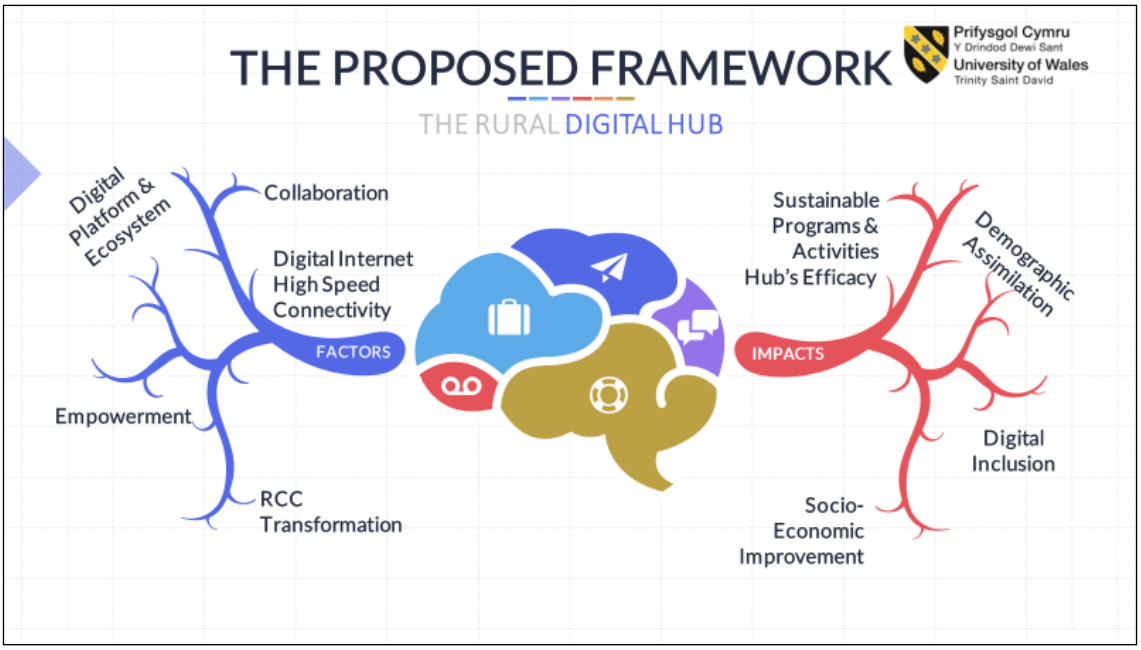

Figure 5.5 The Proposed Framework for a Practical Business Application of the Rural Digital Smart Village Enablement Program

This was due to the fact that it would be much easier for the modern business world to understand and apply to any rural area in any region or country as and when needed. The determining factors were streamlined into the following categories: empowerment, RCC Transformation, digital platform and ecosystem, collaboration, and the ever-important digital internet high-speed connectivity. The impacts were streamlined as the Sustainable Programs and Activities, the Hub's Efficacy, Demographic Assimilation, Digital Inclusion, and Socio-Economic Improvement.

5.5 Challenges and Limitations of the Study

There are several key challenges that lie ahead before the rural communities of Malaysia can leverage the high-speed internet connectivity, which powers the proposed Rural Digital Hub Smart Village Enablement Program. The economic composition (including entrepreneurship) of rural areas is made up of lower value-added services (approximately > 50% of GDP*) and agriculture, with a sporadic presence of industrialization (Ministry of Rural Development 2018b). In other words, the economic yield from such activities needs to be increased on a large scale; having cooperatives comprised of the rural communities and the village council would be strongly recommended.

In addition, the respective rural locations in each state have their own unique challenges that would require customized efforts to help spur and accelerate economic sophistication. As a result, there is a critical need for local participation and involvement to stimulate relevant digital services and applications, specifically for the needs of the locality. Outside industry players from the private sector are sorely needed to lend their expertise, but the programme must be locally driven to ensure sustainability (Bock et al. 2013; Roberts et al. 2017a).

Furthermore, job opportunities that are progressive (from an income and skills perspective) are inadequate in all rural areas. This is further compounded by mass urbanization. This would be where special collaboration between the government's public sectors and the industry players from the private sectors would be urgently needed to kickstart the proposed Smart Village Enablement Program, with the Rural Digital Hub as

the melting assimilation point for this to happen.

Moreover, also related to the prevailing rural digital divide and exclusion were the logistics and mobility services, which were far less comprehensive and more expensive when compared to those offered in major urban areas. In addition, when compared to those in urban areas, those in rural areas had lower levels of education in critical areas such as science, math, coding, and languages. To ensure long-term operational sustainability and relevance to rural people, the Rural Digital Hub development would need to be rethought. This was because the rural folks in Malaysia did not possess the psychological sophistication and tenacity for continuous life-long learning and self-improvement.

Due to the lack of a fast, stable, and affordable internet connection, digital literacy and proficiency, such as the understanding and use of digital tools such as e-commerce, social media, analytics, and trading platforms to conduct business or enrich oneself, are lagging. Fundamentally, the consequent unequal wealth creation and distribution efforts might further inhibit the desires of rural folks to believe in their individual ability to achieve economic prosperity and a better quality of life.

This study also has some noted limitations. As briefly described, the respective localities of the RCCs were very much subjected to the regional local conditions and sentiments. Hence, cluster sampling was prescribed for the study to reflect the selected regional local sentiments and conditions of the thirteen Malaysian states. In addition, the research methodology was supposed to include site visits to the actual RCCs' locations to physically observe the surroundings and the facilities and conduct the interviews and data collection in-situ.

However, the country was severely impacted by the Covid-19 Pandemic for the past two years, resulting in the interviews and data collected being merely conducted via telephone calls and the physical observations being conducted via gathering feedback from the interviewees. In addition, only thirteen RCCs were selected through cluster sampling to represent the 191 RCCs nationwide.

However, this would not impact the findings, as the data collected showed repetitive answers, which exemplified that data saturation had been achieved and adequately represented the target population of the research. Those 13 RCCs selected also showed typical representation of the total 191 RCCs nationwide, in which those RCCs were typified by poor digital internet connectivity and similar types of programmes conducted. In fact, there was one RCC without any internet connectivity. However, there was one RCC that had just been installed with high-speed digital internet connectivity via Fibre Optics, which, as expected, displayed many activities and programmes leveraging the good internet digital connectivity. On the other hand, the inability to collect data on sites because of the Covid-19 Pandemic was very much regretted, but unavoidable.

The study was by design to focus purely on the RCCs and the RCCs' managers. This was because the research subject was more relevant in terms of the RCCs' and the RCCs' managers' current capacities and capabilities to organise and drive the programmes for the benefit of the rural folks, notwithstanding the absence of good internet connectivity and digital platform. Furthermore, the study was slightly influenced by the change in the government of the day, which resulted in a change in the ministers and senior officers in charge of the ministry.

Unfortunately, this had been translated into the changing priorities of the ministers and the senior officers involved in the Smart Village Enablement Program, which unfortunately was no longer on their top list of priorities. However, the advent of the Covid-19 pandemic has further amplified the rural digital divide and exclusion issues plaguing all the rural communities nationwide, which might again shift the priority of the government of the day to resolve. The proposed Framework for the Smart Village Enablement Program might be the solution to those issues and concerns.

5.6 Recommendations for Future Study

It would be highly recommended for the study to be extensively done to cover all these 191 rural community centres under the Ministry of Rural Development's purview. This would serve to strengthen the findings of the research. In addition, further input and data needs to also be collected from the rural communities surrounding the RCCs to further study the impacts of the Rural Digital Hubs formalization. Currently, Telekom Malaysia has been mandated by the government to roll out the Broad Band Fiberization plan nationwide, in collaboration with the Malaysian Communication Multimedia Commission (MCMC) and the Malaysian Digital Economic Corporation (MDEC), in order to upgrade all existing copper-wired Narrowband Internet connectivity.

Almost all of the 191 RCCs would be upgraded to have digital internet connectivity, thus having the much-required high-speed bandwidth connectivity. This will enable MDEC later to roll-out the My Digital Blueprint, which would be the complete building block of the Digital Platform eco-system to enable the Smart Village Rural Digital Enablement

Program. Hence, it would be highly recommended for another study to be conducted to review the proposed framework and to revisit the impacts of the rural digital economy on all 191 RCCs.

Figure 5.6 exemplified potential future research to explore the potential for new rural digital services and applications. This would be where the study could be conducted to see the impact of the collaboration of the industry and private sectors in helping the local rural communities formalise relevant services to improve the quality of their rural lifestyle. Local rural community involvement would be crucial to ensure the developed services were relevant and, hence, sustainable.

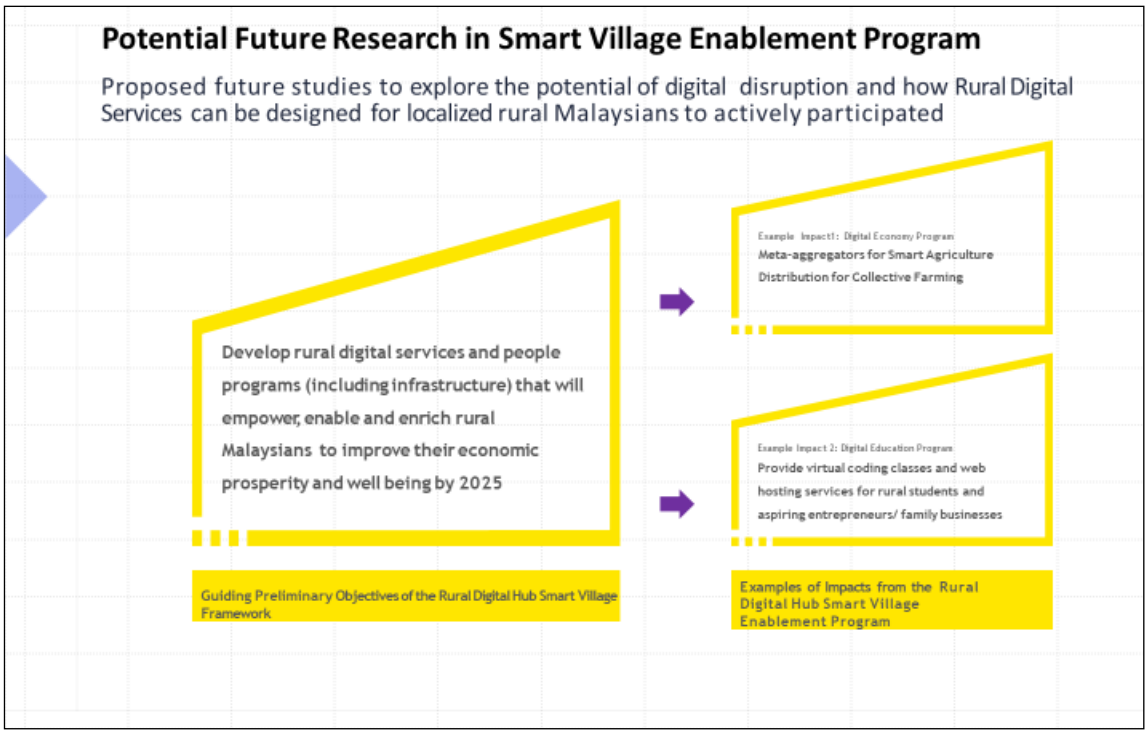

Figure 5.6 Potential Future Research in Exploring Potentially New Rural Digital Services

Figure 5.7 shows examples of Smart Agricultural for rural farmers and Rural Smart Classroom for rural youth. It depicted a potential future study on rural digital agriculture, including potential digital infrastructure requirements to be fully realised and implemented for the benefit of rural farmers in increasing their potential yield and revenue generation. It was clear that the digital platform and ecosystem were very relevant to improving the supply chains and service delivery, which are very pertinent core requirements for ensuring the successful conceptualization of the Smart Village Enablement Framework.

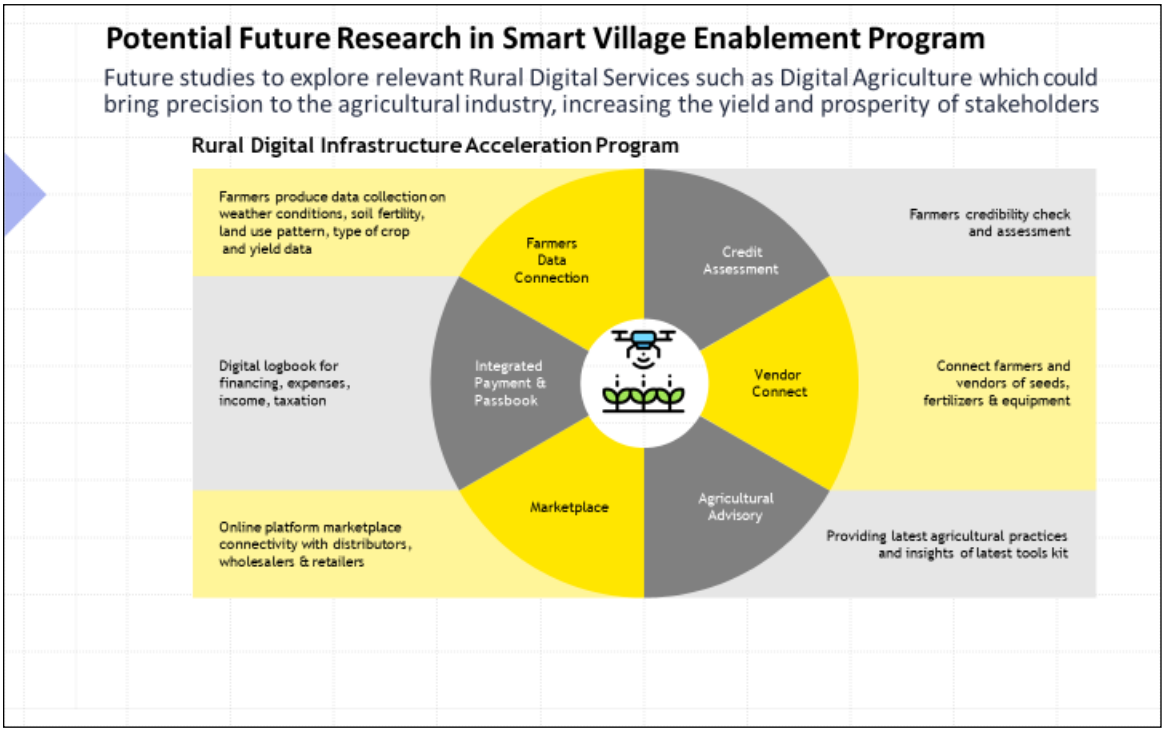

Figure 5.7 Potential Future Research in Exploring Various Relevant Rural Digital Services

In all processes and systems requiring human intervention, especially as proposed under the Smart Village Rural Digital Hub Framework, it would be important for future study to look at the human capital development involving the local rural community as well. Figure 5.8 shows an example of how future research could be undertaken to study the local rural community's human capital development for youth and entreprenurers.

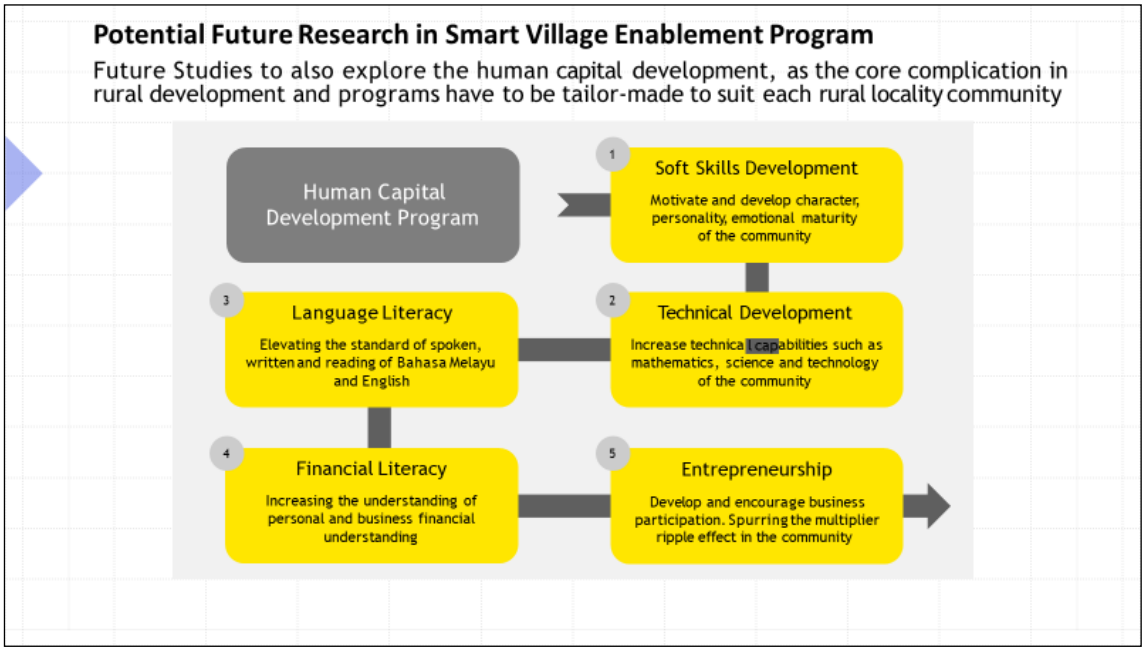

Figure 5.8 Potential Future Research in Exploring Human Capital Development, under the Proposed Smart Village Enablement Program Framework

In fact, this would be just the tip of the iceberg in terms of the potentially many future research projects that could be undertaken by scholars as well as business consultants to review, develop, and prescribe for the respective rural communities in the countries and regions.

5.7 Conclusion

The main objective of this study was to identify the factors and the subsequent impacts of the rural digital economy's propagation through the conception of the Rural Digital Hub Smart Village Enablement Program. The identified determinant factors and their subsequent impacts were then uploaded into the NVivo software to derive the thematic coding upon which a relationship framework was evolved. This would then be further streamlined to produce the proposed framework for the Rural Digital Hub development, under the Smart Village Program Enablement, or under any similar conception that could be prescribed anywhere else. The proposed framework should be very dynamic and evolve in nature, adapting to the ever-changing technological trends as well as the local needs of the respective regional rural communities' requirements.

The acquired results from the data collected were sufficient in producing the proposed framework under the limitations caused by the Covid-19 Pandemic. The findings were consistent throughout all the RCCs approached and were predicted to yield the same findings if all the selected RCCs under clustered sampling were approached. The findings were also confirmed during subsequent meetings with the main stakeholders—the Ministry of Rural Development and Telekom Malaysia—on the factors, determinants and impacts of the proposed Rural Digital Smart Village Enablement Program, which produced the proposed framework inadvertently.

The result also further strengthens the works of others upon whom this study was based. In fact, this study was successful in completing the digital eco-system requirement for the development of a rural digital economy by emphasising the critical elements of

having good high-speed internet digital connectivity, supported by the digital ecosystem and platform to enable the relevant rural digital services.

The strength of this study would be in the business implications and applications, with the Proof of Concept (POC) established prior to the start of this study. The proposed framework would allow others to prescribe and apply to their respective regional rural communities, with their own locality involvement and requirements. However, in order for the framework to be successfully deployed and conceptualized, the government of the day must maintain a consistent mandate and commitment, as well as the support of the leading industry players and private sectors.

Without such collaboration, this rural digital smart village enablement programme would not be successful. Success stories from China and Europe demonstrated what could be accomplished if the government was persistent and committed to its agenda and the industry and private sectors were brought in to support it with local participation. As shown, the proposed Smart Village Framework could be further strengthened and evolved with future potential studies as suggested.

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