Assessing the effect of ICT on Political Contestation

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Assessing the Impact of Information Communication Technology on Political Contestation

By

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Submitted in Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

Supervised by

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“This thesis is dedicated to my family”

Abstract

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The rapid development of information communication technologies (ICT) in the 21st century has transformed the social, economic, and political sphere globally. During the same period the number of protests has also increased, raising the question of whether these two factors are causally related or just coincidental. To date this debate is unresolved: on the one hand it is argued that ICT is a liberation technology enabling protest mobilization, on the other hand it is seen as a repression technology reducing protests by increasing governments' monitoring suppression capabilities. Insufficient theorizing followed by rigorous empirical testing of the hypothesized mobilization mechanism and a lack of fine-grained and high-quality protest data are two of the main reasons why existing research has failed to resolve the liberation-repression technology debate so far. This thesis contributes to this literature both theoretically and empirically. First, I perform a within-country study on the effect of changes in two types of technologies, first, Global System for Mobile Communications (GSM) (i.e. texting, voice) and second is Third Generation of Wireless Mobile Telecommunications Technology (3G) (i.e. internet) on protest onset in Malaysia using high-quality and fine-grained protest data from police reports. I find that neither an increase in GSM nor 3G coverage has a robust and substantively meaningful effect on protest occurrence. Second, I re-conceptualize and theorize the most commonly invoked mobilization mechanism in the existing literature as a coordination game, arguing that the shared network information contained in a social media post ought to enable coordination. I assess the argument via an experiment embedded in a household

network survey in six rural villages in Malaysia, finding limited support for the coordination mobilization mechanism. Finally, I provide an alternative argument on how ICT might affect protest mobilization based on social network theory. Using data from an original two-wave household-level social network survey in rural Malaysia, I find some suggestive evidence that the introduction of the internet tends to change political networks to more connected structures that allow for more rapid mobilization when triggered. This suggests that the impact of ICT on protest is conditional rather than unconditional and that the underlying mobilization mechanism may rely on changes to the political network structure rather than post-specific network information enabling coordination. The thesis points towards social network analysis as a fruitful avenue for future research on ICT and protest and holds important policy implications concerning the consequences of the rapid spread of ICT throughout the developing world.

Keywords: protest, information communication technology (ICT), social movement, collective action, coordination.

Declaration

The work in this thesis is based on research undertaken at the Centre for Institutions and Political Behaviour, School of Government and International Affairs, Durham University, England. No part of this thesis has been submitted elsewhere for any other degree or qualification and it is all my own work. I further declare for those quotes, citations, or references that have been appropriately acknowledged, this thesis is the result of my original investigation.

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information on local telecommunication development and others who have been involved both directly and indirectly towards the completion of this Ph.D. thesis.

Finally, I hope that this study will act as a guideline for future studies and reinforce any weaknesses in the future and help the community.

Thank you.

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Abbreviations

Abbreviation	*Description*
3G	Third generation of wireless mobile telecommunications technology
BN	National Front *(Barisan Nasional)*
GDELT	Global Data Events, Location and Tone
GSM	Global System for Mobile Communications
Kg	Short form of "*kampung*" in Malay, which means "village".
MCA	Malaysian Chinese Association *(Persatuan Cina Malaysia)*
MCMC	Malaysian Communications and Multimedia Commission (*Suruhanjaya Komunikasi Dan Multimedia Malaysia*)
MIC	Malaysian Indian Congress (*Kongres India Se-Malaysia*)
MMA	The Mass Mobilization in Autocracies Database
PAS	Pan Malaysia Islamic Party (*Parti Islam se-Malaysia*)
PH	Alliance of Hope (*Pakatan Harapan*)
SNA	Social Networking Analysis
SNS	Social Networking Sites (*Laman Rangkaian Sosial*)
UMNO	United Malays National Organisation (*Pertubuhan Kebangsaan Melayu Bersatu*)

**Note: Malay words given in italics

Chapter 1

INTRODUCTION

Recent years have witnessed much contention between citizens and governments worldwide. People in many parts of the globe have rallied against their governments to express their frustration to their leaders. In France, Lebanon, Spain, Hong Kong, and many other countries, protests have erupted over political and socio-economic change, indicating that ordinary people are at breaking point and totally disillusioned by the dysfunctional status quo.

The emergence of these protests caught the world unaware, while the tools of choice for the protest activists were not guns and bombs, but the internet and mobile phones (Hashem, 2015). Today, the internet has enabled world-changing events to be recorded and streamed in real-time by people on the street through various forms of communication such as text, voice, or even videos. These can expose the unthinkable brutality of a repressive regime.

This situation is regarded as becoming increasingly common. One could argue that the existence of new technologies reduces organisational costs and increases informational efficiency (Manacorda & Tesei, 2019). The idea that new communication technology promotes democracy stability and peace is not new. Since the early days of Gutenberg's invention of the printing press in the 15th century, the pivotal uplift of communication development has facilitated the human understanding of ideas and customs outside an individual's experience, while at the same time hastening the development of democracy (Campbell, Martin, & Fabos, 2016). This optimism was reflected in the European circumstances of the early 1930s, when the newly invented radio was not only employed as an information tool, but also contributed to the rise of the Nazi party and propaganda (Vaughan, 2008). Indirectly, this indicates that politics has always been affected by communication technology and, at first glance, this assumption seems plausible.

Information and Communication Technology (ICT) has become a significant tool of global importance to modern contentious political processes, also known as *Facebook / Twitter Revolutions* (Farrell, 2012; Lysenko, 2011; Zuckerman, 2008). This optimistic view has become a common theme in the discourse concerning the political effects of modern communication technology. It seems that people generally accept that ICT has made considerable improvements by expanding their political and economic freedom, as described in *Liberation Technology* by Diamond, Palfrey, Rohozinski, and Zitrain (2010). Unlike autocratic countries, democratic countries impose no restrictions on civil liberties and promote positive political participation among the general public (Kann et al., 2007). Hence, allowing political dissent in the form of political protest has become more common in democratic countries than in autocracies, as recorded in the Cross-National Time-Series Data Archive (CNTS) (Banks, 2011).

Previous researchers have examined the association between the use of social media and protest behaviour. Among the results identified by Breuer et al. (2015) and S. Valenzuela, A. Arriagada, and A. Scherman (2014), for example, were that social media platforms such as Facebook and Twitter had an effect on the possibility of protest. Their studies referred to the Tunisian revolution of late 2010 and early 2011 and student demonstration in Chile, which had resulted from social media platforms mobilising protest. In general, past studies have revealed that ICT is a major instrument in mobilising anti-regime protest across the globe.

Apart from the studies mentioned above, research by Pierskalla and Hollenbach (2013) has shown that where cell phone coverage is available, there is a major increase in the "probability of violent conflict" (p. 220). In their study, the setting was Africa, where communication technology in terms of cell phone use created group collaboration that allowed actions to be planned smoothly.

In contrast to this popular narrative, the ways that ICT development is regulating protest was studied extensively by Weidmann and colleagues (Rød & Weidmann, 2015; Shapiro & Weidmann, 2015; Weidmann & Rød, 2019b). The global development of ICT started in the 1990s, when it became readily available to many people. Rød and Weidmann (2015) conducted an extensive study of

authoritarian countries from 1993 to 2010, the results of which showed that ICT had no clear effect on protest. As protests often occur in urban areas, many have been associated with the advancement of ICT in urban areas, which may lead to widespread protests. However, their latest discovery shows consistently that there is little evidence supporting the argument that the role of ICT development is influential in bringing about extra-institutional political change (Weidmann & Rød, 2019b).

Some have also argued that autocratic states might be using this technology to reduce the risk of people's uprisings. Morozov (2012), as well as Pearce and Kendzior (2012), have given different evaluations of ICT and its function in authoritarian regimes. ICT development has also offered many advantages to autocrats that allow them to control and observe popular sentiments, which may enable them to eradicate early resistance movements. For example, before being banished by the people, Ben Ali had managed to rule Tunisia for 23 years. He could maintain his position due to his media control and internet policies (Breuer, Landman, & Farquhar, 2015, p.771). During his time, Ben Ali blocked access to political sites and only allowed Facebook for recreational use. In Iran, a survey by ViewDNS.info [1] reported that access to websites containing information independent of the regime was becoming increasingly restricted. Additionally, being connected to the Internet facilitates the identification and removal by an authoritarian government of any individuals who potentially threaten the state. As has been the case in China, Vietnam, Myanmar, Ethiopia, Turkey and Iran, several bloggers and reporters have been detained for exposing the wrongdoings of their governments (Beiser, 2018). The inevitable changes in world communication development have indirectly forced authoritarian regimes to adapt to and embrace these changes (Mackinnon, 2010). This has not been limited to filtering and censoring online dissent, but includes embracing the use of new and improved communication technology to influence and frighten the public not to act against the government.

[1] ViewDNS.info, "Current State of Internet Censorship in Iran", March 23, 2012, https://viewdns.info/research/current-state-of-internet-censorship-in-iran/

Hence, does the ICT benefit the people by allowing them to monitor their government or is it more feasible to regard ICT as an instrument with which the government can reduce the risk of political contestation / popular uprisings? Academic opinion on this question is divided. Both sides of the debate can be supported by comprehensive studies. The existing evidence suggests that the effects of ICT on protest mobilisation are unclear. The way ICT affects political behaviour is complicated by the mixed empirical record. A stronger framework is needed to understand how communication technology may lead to protest. At the same time, however, it is essential to improve the way we conceptualise and theorise the ways that ICT affects protest mobilisation. This would provide more nuanced insights on the potential function of ICT to drive protest mobilisation.

Most previous studies have been limited by several main issues; first, many of them drew on unclear theoretical foundations. The existing studies have generally been developed from imprecise standpoints, such as collective action theory, which is overshadowed by economic perspectives. Moreover, the existing literature also fails to explain how communication affects collective action.

Second, the data obtained were less convincing; for example, the existing studies have used media sources databases like the GDELT (Global Database of Events, Language, and Tone), which is hampered by multiplication and over-reporting. Third, the existing studies have not accurately examined the overall impact of ICT development because the independent data used was taken from the GSM (Global System for Mobile Communications), which is not an internet function. Fourth, previous studies have not explored the possible changes at the interpersonal level. This is considerably important the existing studies appear to only provide an overall picture of protest but lack detailed information about the key influence on these scenarios, which is the individual. Protest activity is risky, so there is a need for communication and the transfer of information. Logically, it is almost impossible for a protest to occur if no communication exists at the interpersonal level. Thus, it is important to understand the mechanism and the communication structure behind it. In the author's opinion, these deficiencies in the current literature have prevented accurate interpretations of the actual situations. In this study, the author proposes to regard protest as a coordination

problem and provide a clear and explicit mechanism to explain how communication enables coordination.

To expand the academic debate concerning the role of ICT in protests, several challenges must be overcome. First, it is essential to identify whether ICT development or internet progression are, in fact, the main factors behind protest. The second challenge is to determine the mechanism for the influence of ICT on protest, while the third challenge is to outline whether ICT has a clear and direct effect on protest.

To gain a comprehensive understanding of this topic, it is necessary to obtain the highest-quality data on protest as well as the geographical internet progression within exact areas and populations. In addition, a precise methodological approach is needed to address the mechanism of protest, while an innovative strategy is required to study the effect of ICT on protest.

Most importantly, to address all of these challenges, it is crucial to examine a specific study context. In this study, Malaysia was chosen as the context of the study. There are some significant advantages of focusing on single case studies. A specific context ensures data robustness and persistence. Meanwhile, single case studies minimise confounding elements such as economic differences, population, income, urbanisation, geographical layout, ethnicity, and past conflict/incident, which potentially intrude on the relationship being tested.

Narrowing the perspective to a single country case study provides an in-depth explanation of the causal mechanism. Since the approach of data gathering over time and the within-unit variation is specific, a single unit carries more weight than cross-units (Gerring, 2004, p.349).

However, there are also disadvantages of a single country case study. The analysis in this thesis largely refers to a specific context (Malaysia), which makes it difficult to empirically generalise the findings to other populations. This thesis also lacks representativeness in terms of the level to which the causal relationships demonstrated in this specific context may be assumed to apply to other contexts (i.e., other countries). Apart from that, this thesis does not narrowly

discuss the specific features of protest events, such as why and how a particular protest occurred, but examines the topic as a whole and over time.

Why is Malaysia a useful context to study? Malaysia was selected based on several key unique features that benefited this research. Firstly, Malaysia is a country governed through a system that combines autocracy and democracy. Malaysia has recently experienced various political and economical transitions. Secondly, Malaysia is not a poor country, unlike some countries in Africa that are struggling with poverty, poor infrastructure and limited mobile phone communication technology. Over time, Malaysia has experienced consistent improvements in ICT accessibility. Thirdly, in parallel to that, there has also been an increase in the number of protests in Malaysia, suggesting a link between the former and the latter and thus warranting further investigation of this potential association.

Focusing on a specific context reduces within-country spatial and temporal variation, which commonly influences protest participation and is often related to socioeconomic factors. In an attempt to minimise the barriers embedded in global-level studies, a complete space-time database of Malaysia's protests was developed from police reports to serve as a reliable tool for exploring the impact of ICT on protest in a far more comprehensive way. The context of the study is thoroughly discussed in Chapter 2.

1.1 Thesis Outline

This research is divided into six chapters. The core of the theoretical arguments and empirical findings were addressed by the formulation of three different research designs that complement one another. Each design will be presented in a specific chapter (Chapters 3, 4, and 5).

The next chapter begins with a description of the research context, which is Malaysia. In this chapter (Chapter 2), the author focuses on and extensively discusses Malaysia's political background, information and communication development, as well as the background of protests in Malaysia. Malaysia is

neither a pure democracy nor a pure autocratic system, so it is commonly known as a hybrid regime. It had been ruled since independence by a one-party government (Slater, 2012). Unexpectedly, in May 2018, *Barisan Nasional* (the National Front) lost their ruling power for the first time after 61 years of independence. They were toppled by a four-party coalition, *Pakatan Harapan* (the Alliance of Hope), whose joint seats led to a parliamentary majority.

In all facets of communication and technology, Malaysia is a rapidly developing country. Malaysia has a population of 32 million, 68.1% of whom are internet users.[2] Malaysia has greatly improved its internet connectivity over the years. The transition of the Malaysian online environment has been highly significant to social movement activities as online platforms (blogs, Facebook, Twitter, along with internet-enabled mobile devices) have reached a wider domestic population (Postill, 2014).

Chapter 2 also presents the development of ICT in Malaysia. This progression provided opportunities and methodological advantages for this research. For example, as ICT development in Malaysia is ongoing, some places are still without an internet connection. This allowed the author to experimentally explore the variations in exposure to ICT. This experimental approach aimed to manipulate the key predictor of interest by empirically examining pre- and post-ICT exposure to determine the effect of this treatment on protest. This condition also allowed an analysis of the effects of ICT on protest activities within a natural environment. This will be further explained in the design section of each subsequent chapter.

The number of people with internet accessibility is continuously growing due to ongoing coverage expansion; simultaneously, an increasing number of protests have been occurring. While Malaysia is a semi-autocratic country with freedom of communication, people can use social media as a tool for political messages. Malaysia is not classified as a hard-line country such as China or North Korea, where people are unable to fully exercise the right to freedom of

[2] https://www.internetlivestats.com/internet-users/malaysia/. Retrieve on 21 November 2019

expression. For instance, North Korean citizens are not allowed to criticise the government or even have any ideological understanding that differs from that of the government (Ryu, 2018). Similarly, China, which is ruled by a single party, also has very strict rules on freedom of expression (Wong, 2004). This is why it is very rare for any protests or uprisings to occur in these countries. The democratic practices in Malaysia still allow people to express their rights through protest. From 2007 until 2017, 243 protest events were recorded and the numbers are increasing every year.

Chapter 3 assesses the impact of ICT on political protest by examining the relationship between internet expansion and protest occurrence. As internet accessibility has expanded, the number of protests also gradually increased. The existing empirical research has predominantly examined the global scale. The results suggest that there is a positive relationship between the internet and protest. However, the studies are vulnerable to various shortcomings. First, most studies focused only on GSM technology, which does not fully support internet connection, and disregarded 3G (Third Generation of Wireless Mobile Telecommunications Technology), which is a powerful technology that enables internet connection. A second issue is the use of incomplete or imprecise protest data from the media global dataset. Therefore, this study addresses some of the major shortcomings of past studies, such as the poor quality of protest data and the failure to examine communication technology that enables access to the internet. In addition, the protest dataset for Malaysia has been developed with the use of police reports dating from 2007 to 2017. A more accurate unit of analysis was used, the district, whereas previous studies relied on artificial grid cells. For the independent variable, the impact was investigated based on two technologies, GSM and 3G. It was discovered that the findings differ from previous literature on GSM. No clear existence was identified of a positive relationship between ICT development and protest. There is a lack of significant evidence to demonstrate the differential effects between the two types of technology (GSM and 3G), which shows that there is generally a lack of evidence for the effects of ICT on protest onset.

In Chapter 4, the content is built upon the previous findings. The current findings produced different results from those of the existing literature, raising the question of how the mechanism actually functions. The current literature is rather weak in establishing the mechanism of protest. Most researchers have discussed collective action/coordination (Bagguley, 2004; Diani & McAdam, 2003a; Epstein, 2011; Goode et al., 2015; Theocharis, Lowe, Deth, et al., 2015; Sebastián Valenzuela et al., 2014; Van Laer, 2007), but many fail to explain exactly how communication has mattered in protest situations. It seems like there has been an underappreciation of the role of communication in protests. Therefore, the theoretical mechanism is unpacked through an extensive discussion of the role of communication technology in the context of coordination games.

The theoretical expectation was derived from the coordination theory, which was expected to enable an understanding of how information using ICT could encourage common knowledge and uphold protest participation. These factors were assessed using a survey experiment with different treatments, with each treatment containing a different piece of information. The survey was conducted with the population in the area and referred to waiting to receive internet connectivity. This created an outstanding opportunity to acquire data from a naturalistic setting. Randomisation was implemented, whereby the respondents were assigned into three treatment groups. The first group (the control group) was treated with a newspaper article, the second group received information on a popular Facebook post, and the third group received information on a non-popular Facebook post. The amount of coordination information provided on this play-card stimulus varied while the other information remained constant. The survey experiment was conducted over two rounds with the same respondent to capture any temporal effects. It was discovered that exposure to social media posts, particularly when they contained popular information, did not significantly increase the likelihood that people would be willing to join protests. Investigating the reasons for this, it was found that people did not seem to recognise the coordination information appropriately. At this point, it was found that there was no clear evidence for the relationship in the mechanism suggesting that ICT might affect behaviour through its use. These results reflected those of

Rød and Weidmann (2015) and Theocharis, Lowe, Deth, et al. (2015), who also found that ICT was not a predominant instrument in support of protest participation.

Thus, a lack of evidence was available to support the relationship between ICT and protest, while ICT also made no clear contribution to the coordination mechanism. The results seemed not to support the suggestion in the literature that ICT has a positive effect on protest; at least, it seemed not to hold in Malaysia. So far, the results showed that 1) there is no clear evidence for a generally positive relationship between ICT and protest and 2) no evidence supports the view that ICT enables coordination. So how else could ICT be involved in a protest? Are there any other ways in which ICT could affect a protest? Consequently, these results opened a new route through which to examine the social network structure.

Chapter 5 examines the role of ICT in changing the structure of the networks. It is argued that ICT works as a mediating factor by changing the structure of social networks, making protest mobilisation more effective. In particular, it is argued that ICT changes political network structures.

Siegel (2009) investigated the network typography of collective action. Based on his studies, the author explored the dynamic changes to political network structures by considering the influence of new communication developments on political networks. ICT is an important variable to discuss as it has changed the global landscape of communication and potentially affects social network structures. To understand the specification of each network typography, an artificial network was re-created to generate details of the specification. Then, longitudinal social network surveys were conducted and analysed. Supportive empirical evidence is provided to demonstrate that ICT has a positive influence on social network structures by widening people's connections outside their locality. It is suggested that network typography has positively changed to become one dense network. The results also show that ICT has a dynamic effect on a social network's structure, especially political networks.

Finally, Chapter 6 draws conclusions from all the evidence from these three different research designs. This study has opened a new dimension to the

overarching debate on liberation and repression technology. From the popular narrative, ICT is a significant factor in political contestation worldwide. However, this empirical evidence indicates that ICT has no clear effect on protest activism and coordination; nevertheless, the impact of ICT has been found to be more effective on social networks. ICT modifies the network structure of political interaction and potentially affects protest participation.

1.2 Contributions

In terms of its overall contribution, this thesis augments several main areas by providing theoretical and empirical contributions. Chapter 3 makes an empirical contribution by distinguishing between different ICT technologies (GSM and 3G) in a within-country comparative design, while allowing alternative explanations to be rejected.

Furthermore, an empirical contribution in a specific setting is offered. Higher-quality protest data is used that has no accuracy issues, unlike the global protest data used by Pierskalla and Hollenbach (2013) as well as Christensen and Garfias (2018). The analysis was derived from fine-grained information and specifically recorded protest events. In addition, the local scale was investigated using a precise unit of analysis, the district. This approach offers a better sense of reality and authentic interpretation compared to the use of artificial grids.

Chapter 4 reports an experimental test of the coordination mechanism underlying the liberation thesis. Hence, the chapter presents the results obtained from a comprehensive investigation of field experiments measuring the effect of ICT on an area that has never had internet network capability. The field experiment in the naturalistic environment delivered the most natural response from the respondents, thus making this empirical evidence exceptional.

Chapter 5 reports a theoretical contribution by highlighting an alternative way in which ICT might affect protest. This chapter presents the exploratory study, which predominantly focused on social network structures and political protest. This evidence makes two contributions to research on networks and

participation. First, it indicates how ICT modifies social network structures; second, it offers a more detailed specification of political network structures.

This chapter established the tone of this study, its perspectives and how it contributes to the existing literature on protest and ICT, specifically in the context of Malaysia. The following chapter considers the context of the study in greater detail.

Chapter 2

CONTEXT OF THE STUDY

This chapter aims to provide an understanding of the context in which the research occurred. Undoubtedly, the suitability of the context is influenced by the background of the state itself. This chapter provides an extensive background to information communication technology and protest in Malaysia. This chapter is organised as follows: 1) the demographic and political background of Malaysia is discussed, followed by 2) the local development of ICT and 3) a discussion on protest and social movements in Malaysia. After that, the justification for protest variations and how this is interrelated with ICT development are described.

2.1 Malaysia as the Research Context

The aim of this section is to explain the background and political atmosphere of Malaysia. It provides a brief discussion of the long history of the formation of Malaysia and shows the transition that occurred in terms of the system of democracy and government.

Before Independence, Malaya had experienced a long occupation period for more than 400 years by three European powers, namely the Portuguese from 1511, the Dutch from 1641, and the British from 1786, with an interval in which the Japanese were in control from 1941 until their surrender to the Allies in 1945. The main reasons for these long occupations were due to the natural resources and strategic location of Malaya (as it was called). In historical terms, English merchants and businessmen were conducting trade in the Malay states during the 17th century. Subsequently, towards the end of the 18th century, the British East India Company, then based in India, began to take a serious interest in the economic activities of the Malay States (Yaacob, 2011). The transitions of colonialism significantly affected Malaya's social and political ecosystems, particularly under the British. The British introduced a system of democracy and administration that brought modernisation to the Malaysians.

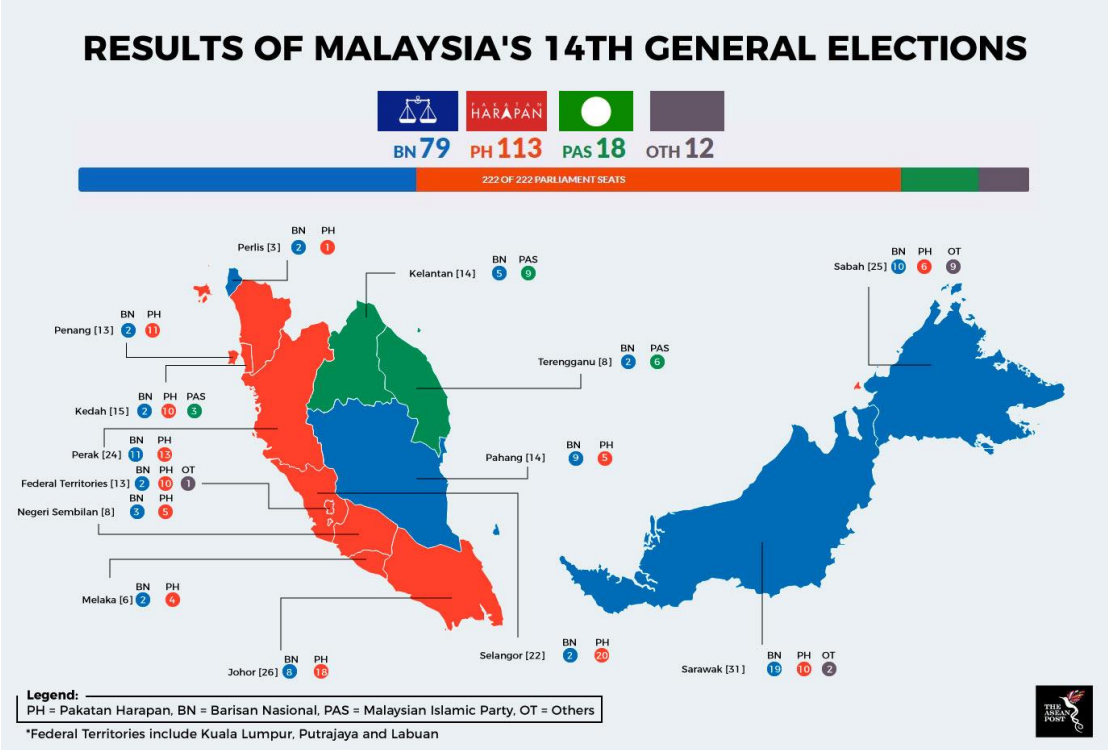
Post-independent Malaya, now Malaysia, consists of 13 states and a population of about 30 million.[3] The impact of colonialism has made Malaysia into a multi-ethnic society that distributes the population into three major ethnic groups: the Malays / Bumiputera (indigenous), who account for 61.9%; Chinese, who account for 22.6%; and Indians, who make up 6.7%. Other ethnicities represent 0.7% and non-citizens 8.2%. The multi-racial diversity, historical background, culture, heritage, religions, and multitude of languages harmonise with one another in unique ways that distinguish Malaysia from many other countries.

Many political scientists have described Malaysia as neither a clear democracy nor a clearly autocratic country, so it is often classified as a hybrid regime (Abbott, 2009; Diamond, 2002; Miner, 2012). Malaysia was dominated by a one-party government since Independence (Slater, 2012). Based on the online support retrieved, it is notable that *Barisan Nasional* (BN), otherwise known as the National Front, was the world's longest-serving government. Meanwhile, a major change emerged in 2018 when, after 61 years, the BN government succumbed to the new coalition known as *Pakatan Harapan* (PH), otherwise known as the Alliance of Hope. The election results saw PH winning a combination of seats that led to a parliamentary majority.[4] Other than these two main political parties, the third block coalition, *Gagasan Sejahtera* (or Harmonious Might), through *Parti Islam se-Malaysia* (the Pan-Malaysia Islamic Party (PAS)), also won several seats in the last election.

[3] Source: http://www.kkmm.gov.my/ - Department of Information, Ministry of Communication and Multimedia, Malaysia- Retrieved on 2 August 2020

[4] Source: https://www.business-standard.com/article/international/malaysian-poll-longest-sitting-party-barisan-nasional-loses-after-61-years-118051300274_1.html- Retrieved on 13 March 2019

Figure 2-1: Distribution of Winning Parties



Note: The colours show the distribution of the winning parties in General Election 14, 2018. Red represents *Pakatan Harapan*, blue represents *Barisan Nasional*, green represents *PAS*. The figures were adapted from *Malaysia in transition* by the ASEAN Post, retrieved on August 20, 2020 from https://theaseanpost.com/article/malaysia-transition. Copyright 2020 by Digital Media Nusantara.

Figure 2-1 shows the details of the parliamentary seat distribution, according to the winning parties. *Pakatan Harapan* (the Alliance of Hope) won 113 seats and *Barisan Nasional* (the National Front) won only 79 seats, from a total of 222 parliamentary seats. Meanwhile, *PAS* (the Pan-Malaysia Islamic Party) won 18 seats, followed by others / independent candidates, who won 12 parliamentary seats.

It has been established that Malaysia is a country in political transition. In recent years, political turmoil has given rise to protests and movements against the government. Democratic practice has positively transpired, as shown from the last election. This ended the labelling of Malaysia as an autocratic country or a competitive autocracy governed by a single party. The following section discusses information and communication developments in Malaysia in detail before embarking on the topic of protest.

2.2 Information and Communication Development in Malaysia

The following section outlines the development and usage of the Internet. Internet progression in Malaysia is discussed, which has been a focus of Malaysia's ongoing development plans. From the author's point of view, this is important because Internet development has been emphasised in the state agenda, which has also moulded the way people use communication technology in their daily life.

Malaysia is at the forefront of global developments in new communication and technologies. The Multimedia Super Corridor (MSC), initiated by Malaysian Prime Minister Tun Dr Mahathir Mohammad during his first period as premier in 1996, was a significant reason for the proliferation of internet usage in Malaysia. A study by Hai and Nawi (2007) revealed that to achieve the Vision 2020[5] objectives, establishing the Multimedia Super Corridor (MSC) program was vital. Moreover, this program aimed to transform the country into a developed state by 2020. This would be achieved by adopting the knowledge-based society framework, Hai and Nawi (2007) stated. Based on 2016 statistics, there were 21,090,777 Internet users in Malaysia, which was 68.1% of the population.[6]

Malaysia Development Plan Contributes to the Growth of New Communication Technology

As the main purpose of this research was to examine the effects of ICT on protest, it was necessary to comprehend the plans and commitment of the authorities in relation to developing good information and communication services for the people.

The background of internet development in Malaysia is comprehensively structured in its Five-Year National Development Plans. Information and communication have been core pillars of these projects since their inception by the British government after the Second World War, when they were known as

[5] Vision 2020 or *Wawasan 2020* is the objective of Malaysia to achieve a developed country by 2020, Source: https://www.pmo.gov.my/vision-2020/malaysia-as-a-fully-developed-country/ - retrieved on 10 March 2018

[6] Source: http://www.internetworldstats.com/asia/my.htm - retrieved on 18 March 2018

the Five-Year Development Plans of Malaya.[7] The Malaysia Plans give more holistic attention to the economic development of the whole nation, including Sabah and Sarawak. Each series of national development plans has different themes and focuses, based on the current needs and priorities. They focus predominantly on economic, social, educational, and infrastructural development. One pillar of social development is to enhance information and communication, which has been emphasised since the Sixth Malaysia Plan. The plans also established the Board of National Information Technology to formulate, implement, coordinate, and manage information technology activity.[8] This includes providing communication networks to the whole nation, such as telephone, fax, broadcast, and printed media. The development of information and communication is very important as it provides a solid foundation for advanced economic and technological development.

Several agencies and departments have been formed to take responsibility in line with the objectives of developing and regulating the communications industries. One prominent agency under the Ministry of Communication and Multimedia is the Malaysian Communications and Multimedia Commission (MCMC). Online research indicates that the Malaysian Communications and Multimedia Commission Act of 1998 and the Communication Multimedia Act of 1998 have the power to regulate all activities in the communications and multimedia industry. Apart from this, the Acts are to conduct and promote the national policy objectives in the same industry. The other roles of this prime government agency include overseeing the regulatory framework of the telecommunication, broadcasting, and online sectors. After 2000, the agency also took over the supervision of the postal service sector. This sector is subject to the Postal Service Act 1991 and licensed by the Certification Authorities under the Digital Signature Act 1997, as reported in online materials.[9]

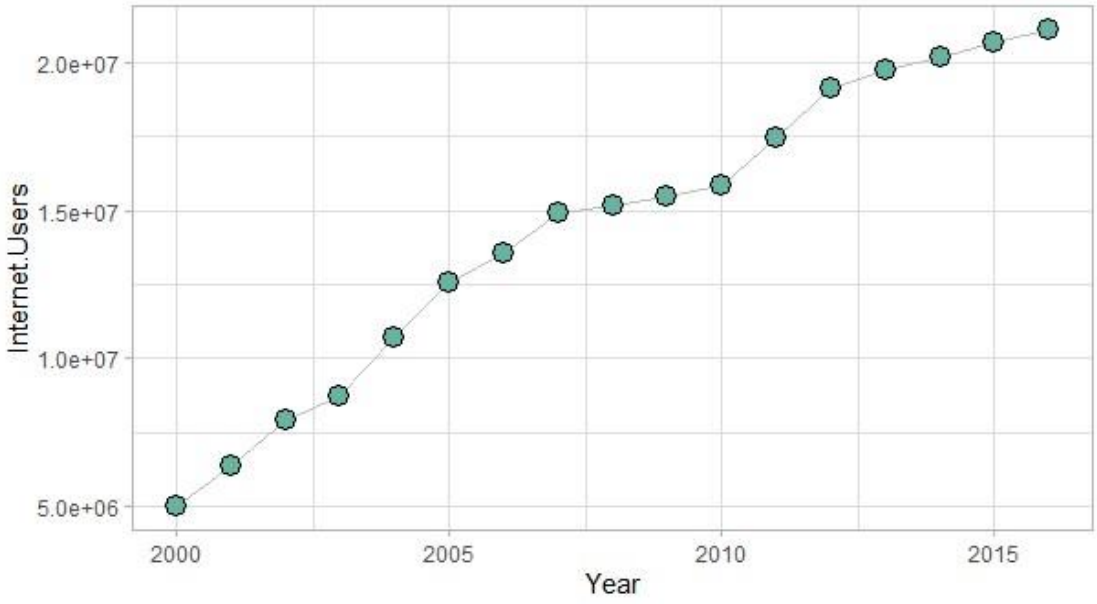
[7] Refer Appendix: Table 2-5

[8] The Sixth Malaysia Plan – p.207, Source: https://policy.asiapacificenergy.org/sites/default/files/6th%20MP_malaysian.pdf, retrieved on 20 March 2018.

[9] https://www.mcmc.gov.my/about-us/our-responsibility retrieve on 6 May 2019

Malaysia's development plan shows that information and communication technologies in Malaysia, especially the internet, have grown significantly every year.[10] In its report on ICT use and access for 2019, the Department of Statistics Malaysia stated that the percentage of households with access to a computer was 71.3%, 90.1% had access to the Internet, and 98.2% had access to a mobile phone.[11] These were major increases compared to their report for 2013, when only 59.4% of households had access to a computer, 58.6% had access to the internet, and 97.0% had access to a mobile phone.

Figure 2-2: Internet Users in Malaysia (2000-2016)



Note: The vertical axis shows the number of internet users in Malaysia. Scientific exponential notations are used to display the numbers by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n*th power. The horizontal axis represents the years 2000 to 2016. The numbers of internet users in a year are indicated by green dots. The figure was constructed using data from *Malaysia Internet Users.* Retrieved September 4, 2020, from https://www.internetlivestats.com/internet-users/Malaysia. Copyright 2020 by Internet LiveStats.com.

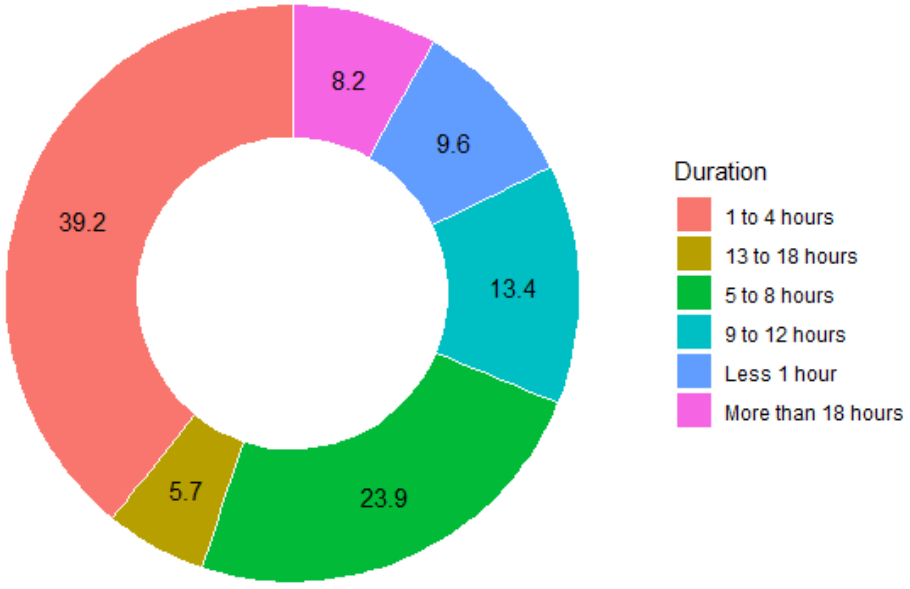
Figure 2-2 shows the number of internet users in Malaysia (in other words, the number of people who adopted ICT) over a 15-year period from 2000 to 2016. Overall, the usage of ICT in Malaysia consistently increased in this period. In 2000, there were only 5,008,465 internet users, but this number increased dramatically

[10]https://www.internetlivestats.com/internet-users/malaysia/ retrieve on 6/5/2019

[11]https://www.dosm.gov.my/ - ICT Use and Access by Individuals and Households Survey Report, Malaysia, 2019 – retrieve on 15 October 2020

to 21,090,777 internet users in 2016. The trend over time indicates that internet use will further increase in the coming years.

Figure 2-3: Daily Internet Use by Individuals in Malaysia, 2018



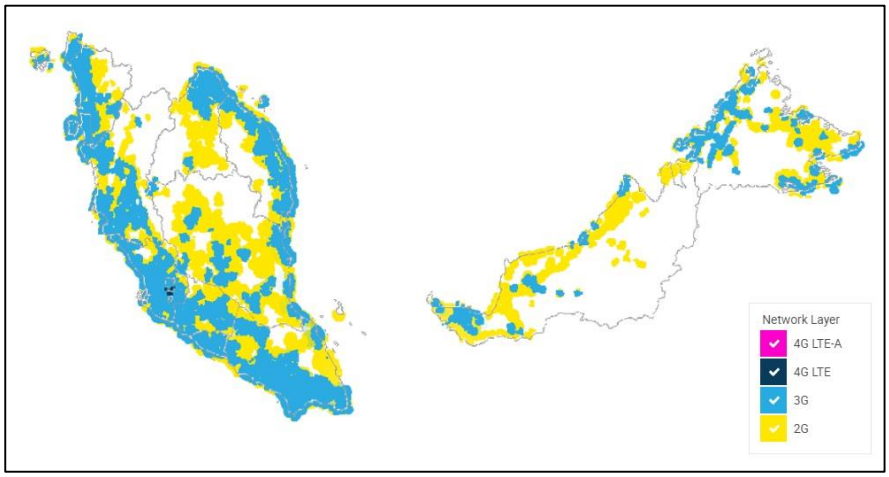
Note: The chart demonstrates the proportions of hourly use of the Internet by individuals in a day. The numbers in the chart represent the percentages of each duration, which are also indicated by different colours. The figure was constructed using data from "Internet Users Survey 2018" by the Malaysian Communications and Multimedia Commission, 2018, *Internet Users Survey 2018,* p.10. Copyright 2018: Malaysian Communications and Multimedia Commission (MCMC).

Figure 2-3 shows the result of a survey on daily internet use by Malaysians in 2018. This study, undertaken by the Malaysian Communications and Multimedia Commission, consisted of a sample of 4,160 internet users across the country. Almost a quarter of the participants (39.2%) spent one to four hours on the internet daily, followed by 23.9% of the respondents who spent five to eight hours online daily. The third highest response showed that 13.4 % of the respondents spent nine to 12 hours online daily. In addition, a small minority spent more than 13 hours daily on the internet. It is clear that internet usage among Malaysians is part of everyday life. The results also indicate the impact of Malaysia's development plan, which included a focus on enhancing effective communication in society.

Internet Progression and Coverage Maps

The development of the internet would not have been effective without the support of industry. Internet development in Malaysia has been driven by several prominent companies that provide cellular broadband and DSL (digital subscriber line) connections.[12] There are three prominent DSL service providers in Malaysia, namely TMnet, Jaring, and MaxisOne Home. In terms of cellular broadband connection, five prominent companies (Celcom, DiGi, Maxis, UMobile, Altel) provide high-speed and wide network coverage throughout the country. The following figures show the coverage progression of DiGi's network from 2013 to 2016.[13] The figures also illustrate the progressive development of the types of technologies, from 2G (GSM) to fourth-generation cellular network technology (4G).

Figure 2-4: Internet Progression Map 2013

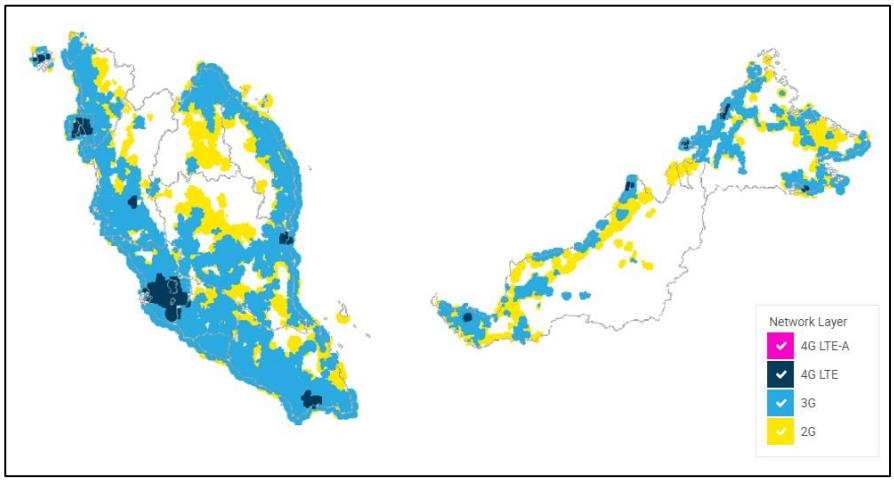


Note: The map shows the coverage area using colours. 2G (GSM) is yellow, 3G is light blue, 4G is dark blue and magenta.

[12] DSF or digital subscriber line is a type of internet connection using telephone line to computer.

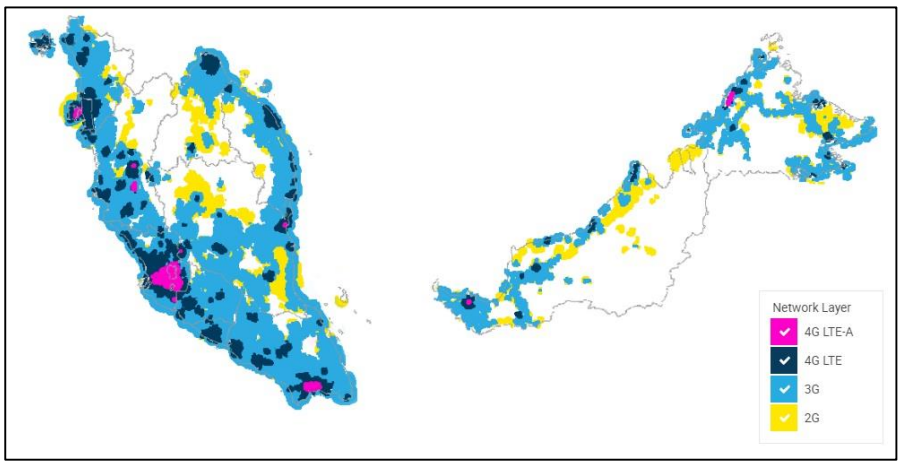
[13] Source from: http://new.digi.com.my/services/experience-4g-lte#coverage-progression. - retrieved on 18 July 2017

Figure 2-5: Internet Progression Map 2014



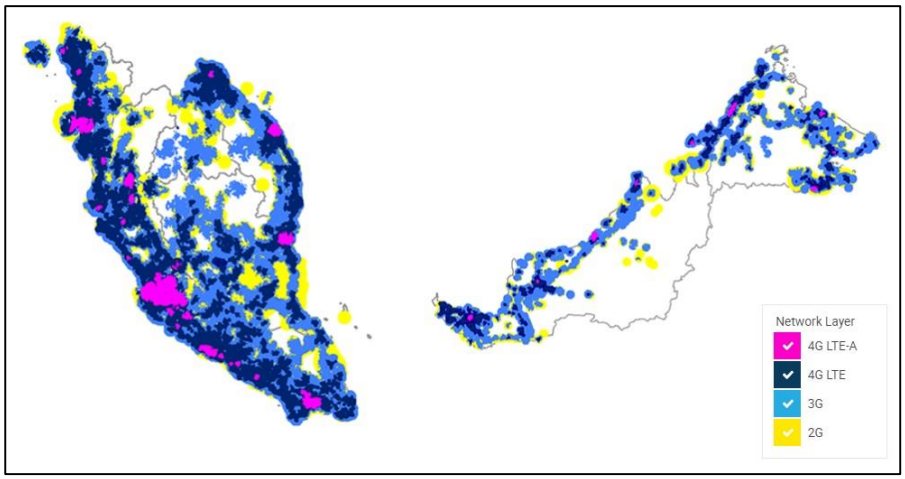
Note: The map shows the coverage area using colours. 2G (GSM) is yellow, 3G is light blue, 4G is dark blue and magenta.

Figure 2-6: Internet Progression Map 2015



Note: The map shows the coverage area using colours. 2G (GSM) is yellow, 3G is light blue, 4G is dark blue and magenta.

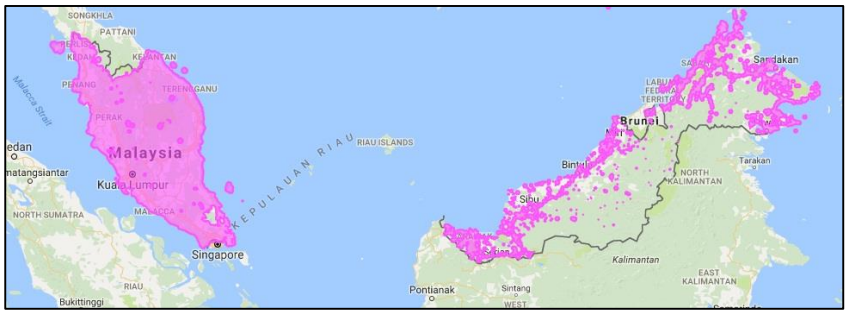
Figure 2-7: Internet Progression Map 2016



Note: The map shows the coverage area using colours. 2G (GSM) is yellow, 3G is light blue, 4G is dark blue and magenta.

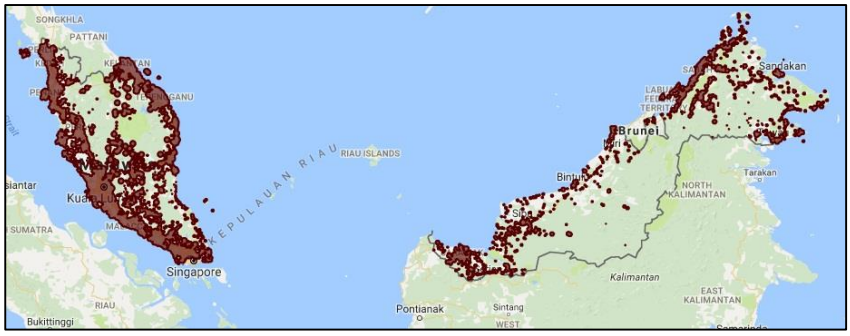
The internet progression activity data provided by DiGi for 2013 to December 2016 appears to show that internet quality and coverage consistently improved in Malaysia year on year. The next figures show the internet coverage data according to MCMC,[14] which comprises all the services provided for cellular and DSL connections. These show a similar trend in terms of internet coverage in Malaysia.

Figure 2-8: 2G Coverage Network in Malaysia (2017)



Note: The pink shading shows the combined coverage networks of 2G for cellular and DSL

Figure 2-9: 3G Coverage Network in Malaysia (2017)



Note: The brown dots show the combined coverage networks of 3G (internet capability) for cellular and DSL

Figure 2-10: 4G Coverage Network in Malaysia (2017)

Note: The turquoise shading shows the coverage networks of 4G for cellular

[14] Source from:http://mycomms.skmm.gov.my/application/WSC_3G_Cov.aspx. Retrieved on 9 July 2017.

One of the objectives of the Eighth Malaysia Plan (RMK 8-2001) was that ICT development would be able to bridge the digital divide between urban and rural communities by increasing the latter's access to technology (Alias, 2013). Initial development focused on highly populated areas but this was gradually expanded throughout the country. The facts described prove that ICT development is rapidly expanding. It will be noted that ICT progression has occurred in parallel with the number of internet users. Furthermore, it is beneficial to understand people's daily ICT activities and the ways ICT is used. Thus, the following section describes the trends and routines of internet usage in Malaysia.

Internet Usage in Malaysia

Almost 70% of the population in Malaysia are using the Internet.[15] In 2014, research done by TNS showed that there is constant connectivity and digital media has enabled Malaysia to become one of the most socially engaged markets in the world.[16] There follows a breakdown of internet users for each state, as of 2014. The information was extracted from an internet survey report by the Malaysian Communications and Multimedia Commission (MCMC) (2014).

The statistics in the table below show that in terms of internet usage, there was no major difference between the urban and rural populations. This also suggests that the development of ICT in Malaysia has been enjoyed by all citizens across different areas and localities.

[15] Source from: http://www.internetworldstats.com/asia/my.htm, retrieve on 8 April 2018

[16] Source from: http://www.tnsglobal.com/press-release/malaysian-internet-users-amongst-global-social-leaders - retrieve on 8April 2018

Table 2-1: ICT Use by States in 2014

State	Population	Urban[17]			Rural		
	***Current estimation*	*Mobile phone (%)*	*Computer (%)*	*Internet (%)*	*Mobile phone (%)*	*Computer (%)*	*Internet (%)*
Johor	3,348,283	95.2	57.5	60.1	89.9	42.7	46.8
Kedah	1,947,651	95.0	51.2	51.9	91.1	40.4	39.0
Kelantan	1,539,601	91.3	53.0	52.8	89.7	38.6	39.2
Melaka	821,110	93.2	66.4	65.6	85.4	49.4	48.5
Negeri Sembilan	1,021,064	96.4	59.9	60.9	90.1	43.2	44.6
Pahang	1,500,817	96.4	67.3	66.5	91.8	42.8	42.1
Pulau Pinang	1,561,383	93.7	58.0	60.7	90.7	46.1	50.1
Perak	2,352,743	89.1	48.8	50.4	85.4	35.4	37.3
Perlis	231,541	94.3	53.6	57.1	91.3	47.8	51.8
Selangor	5,462,141	97.2	74.7	77.6	94.4	53.2	55.4
Terengganu	1,035,977	94.6	57.8	55.5	93.6	44.0	40.6
Sabah	3,206,742	97.5	54.6	54.1	94.6	36.8	36.0
Sarawak	2,471,140	96.5	57.8	58.5	89.9	32.9	29.9
W.P. Kuala Lumpur	1,674,621	98.8	72.1	74.0	-	-	-
W.P. Labuan	86,908	96.0	70.5	69.9	94.9	52.6	53.7
W.P. Putrajaya	72,413	99.7	97.6	98.8	-	-	-

Note: The data was taken from the Internet Users Survey 2014 by the Malaysian Communications and Multimedia Commission. **Estimation of population by states.

As stated in the study by the Malaysian Communications and Multimedia Commission (2018), individuals prefer to use the internet in three specific locations: at home (88.6%), in random places via mobile phones (68.1%), and in the workplace (56.4%). Table 2-2 shows this in detail:

Table 2-2: Locations of Internet Use by Individuals in Malaysia

Location	Percentage (%)
Home	88.6
Random places via mobile telephone	68.1
Workplace	56.4
Commercial internet access facility	26.0
Community Internet access facility	18.2
Educational institution	12.0
Other person's home	38.7

Note: The data was taken from the Internet Users Survey 2018 by the Malaysian Communications and Multimedia Commission.

[17]The classification of area by strata as follows; Metropolitan/Urban population 75,000 and above; Large Urban 10,000 – 74,999, Small Urban/Rural 9,999 and below.

When it comes to the devices used to access the internet, the same report from the Malaysian Communications and Multimedia Commission (2018) shows that Malaysian rely highly on smartphones when accessing the internet. The report also shared the analysis on smartphone ownership, which increased considerably between 2014 (74.3%) and 2015 (90.7%), before rising gradually again until 2018 (93.1%). The second-most-used device to access the internet was the laptop, with 44.2%. Increased internet use through smart TVs (12.3%) and tablets (20.4%) was also reported. The table below summarises the analysis.

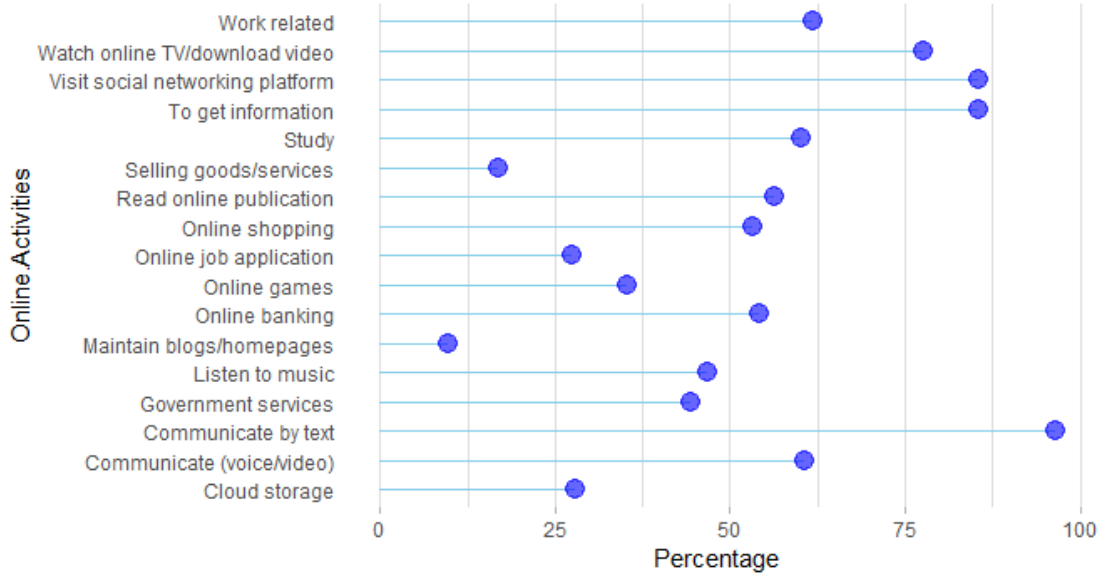
Table 2-3: Devices used to Access the Internet

Device used to access the Internet	Percentage (%)
Smartphone	93.1
Netbook/Laptop	44.2
PC/ Desktop	28.1
Tablet	20.4
Smart TV	12.3
Feature phone	8.6
TV Streaming box	7.6
Game console	4.7
Smart watch	2.4

Note: The data was taken from the Internet Users Survey 2018 by the Malaysian Communications and Multimedia Commission.

In the same report, the Malaysian Communications and Multimedia Commission (2018) also revealed the communication platforms utilised by Malaysians in their daily lives. In terms of users' online activities, the major activity was to communicate by text, which 96.5% of users did, followed by visiting social networking platforms, which 85.6% did. The sample also shows that 85.5% of internet users used the internet as an important source of information. Leisure activities such as streaming videos and watching online TV were performed by 77.6%, followed by work-related tasks, which 61.9% did, and communicating via voice/video, which 60.6% did. The Internet had also offered convenient facilities for educators and students for teaching and learning activities. The results from the sample show that those using internet activities for education comprised about 60.2%. This report also revealed various internet activities that were growing in importance, such as online banking (54.2%) and online shopping (53.3%). Figure 2-11 below gives an overview of users' online activities:

Figure 2-11: Users' Online Activities 2018

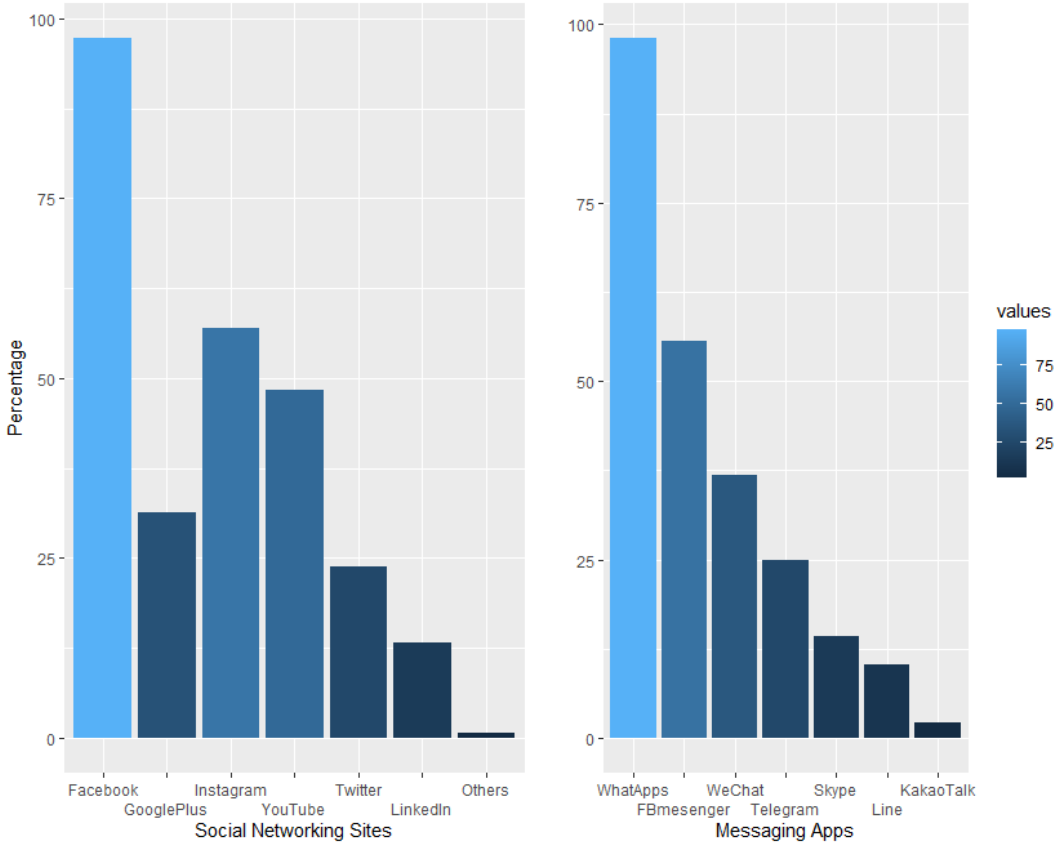


Note: The blue dots represent the percentage of users performing each online activity from the sample obtained. The figure was constructed using data from the Internet Users Survey 2018 by the Malaysian Communications and Multimedia Commission. *Internet Users Survey 2018,* p.13. Copyright 2018: The Malaysian Communications and Multimedia Commission (MCMC).

Apart from online activities, the Malaysian Communications and Multimedia Commission report (2018) also tracked levels of social media platform use. In their survey, an estimated 97.3% of internet users in Malaysia linked to social media sites and visited their social media account almost daily. At 97.3%, Facebook was used the most, maintaining it as the favourite social network in Malaysia. The second and third most popular social networking platforms for Malaysians were Instagram (57.0%) and YouTube (48.3%). Other social networking platforms utilised by Malaysians were Google+ (31.3%), Twitter (23.8%), and LinkedIn (13.3%).

Based on similar online sources discussed previously, the report also revealed that Malaysians tended to actively use communication applications, also known as messaging apps. A total of 98.1% reported using WhatsApp, followed by Facebook Messenger (55.6%) and WeChat (36.8%). Other popular communication applications were Telegram 25.0%, Skype 14.2% and Line 10.2%. The following chart in Figure 2-12 shows further details:

Figure 2-12: Preferred Social Networking Sites and Messaging Applications



Note: The figure above shows two charts combined. The first is Social Networking Sites, and the second is Messaging Apps. Light blue indicates the highest value, while dark blue shows the opposite. The figure was constructed using data from the Internet Users Survey 2018 by the Malaysian Communications and Multimedia Commission. *Internet Users Survey 2018,* p.15. Copyright 2018: The Malaysian Communications and Multimedia Commission (MCMC).

These statistics indicate the new heightened significance of the Internet and social media in providing information to people in Malaysia. The popularity of social networking sites has been increasing rapidly in recent years, with Facebook being the most popular of these sites[18] among Malaysians. Other well-known social networking sites in Malaysia are Twitter, LinkedIn and YouTube. These sites offer the same purpose (to communicate), yet different approaches or environment designs can be used to satisfy the need for human communication and facilitate social interaction.

In summary, this section provides an overview of Malaysia and the development of communication and technology in the country. Various developments and changes have been introduced through the internet to the

[18] Source: http://www.alexa.com/topsites/countries/MY – retrieved on 11 April 2018

Malaysian people. This shows that communication technologies have become a normal aspect of life for Malaysians. New technology allows people to get connected, access information on news websites, post messages on social media platforms, live-stream videos, and many more activities.

ICT has grown rapidly and has been adopted by citizens in both urban and rural areas. Hence, in this on-going ICT development process, there are substantial geographical and temporal variations with regard to access to the internet that will be exploited in this study's analysis of the administrative, regional, and individual levels.

2.3 Protest and Social Movements in Malaysia

This section addresses the historical background of social movements in Malaysia and highlights some prominent protest events. The protest database from the police record from 2007 to 2017 is then discussed. Having established this contextual detail on protest, an overview is given of the protests and social movements that have occurred in Malaysia.

Social movements and mass protests against ruling authorities are not new to the Malaysian political landscape. In 1946, Malay people launched enormous protests around the states against the British government as they tried to limit the power of Malay Sultanates. This resulted in the merger of an assortment of Malay clubs, associations and political organisations to form a party named the United Malays National Organisation (UMNO) (Gomez et al., 2007). UMNO has played a highly significant role in the political history of Malaya. It is the foundation of the uprisings among the Malay people against the idea of the Malayan Union, which was introduced by the British. The protest was successful when the constitution of the Malayan Union was abolished and replaced by the Federation of Malaya in 1948 (Muslim et al., 2013).

Tunku Abdul Rahman, the first Chief Minister of Malaya,[19] focused on the development of the Federation of Malaysia, which involved Singapore, Sabah, Sarawak, and Brunei. An agreement was reached to establish the Federation of Malaysia that would incorporate all these states (except Brunei) on 16 September 1963 and Tunku Abdul Rahman was formally restyled as the first Prime Minister of Malaysia. Two years into the Federation, the People's Action Party, a radical socialist party in Singapore, becomes a drawback for the Federation. The state government showed no loyalty to the central government, leading Tunku Abdul Rahman to vote to remove Singapore from the Federation in 1965.

Further to its economic development, Nair (2007) reiterated that the country's post-independence involved a multi-racial community living in harmony. The country seemed to be free of any political conflict.

Further to that, racial radical influences sparked a racial riot in Kuala Lumpur on 13 May 1969. Malaysia ultimately learnt from this, her bitterest moment. The incident involved clashes between two ethnic groups, the Malays and Chinese, which was particularly serious in Malaysia's capital city. This incident was a major turning point in Malaysian history, leading to the practise of more rational politics and the state being governed effectively by one coalition (Nair, 2007).

Only a few years after gaining independence from the British on 31 August 1957, Malaya was demonstrating good social and economic progress, which has since placed the country as a middle-income country. The literature by Zainal Aznam Yusof and Bhattasali (2008) stated that it was obvious how this country could have reached middle-income status as it had successfully maintained steady growth in the sales of commodities, particularly rubber, tin, palm oil, and petroleum.

In 1970, Tun Abdul Razak became the second Prime Minister of Malaysia. He focused on the reconstruction of the Malaysian people under the New Economic Policy (NEP) to offset the income gap between races, which had been

[19] Before the establishment of Federation of Malaysia, Malaysia was known as Malaya.

one of the major causes of the racial riot in 1969. The third Prime Minister of Malaysia, Tun Hussein Onn (1976 to 1981), continued to stress the issue of unity through policies aimed at rectifying economic imbalances between the various communities in Malaysia. However, due to his health concerns, in 1981 he was succeeded by Dr Mahathir bin Mohamad, his deputy. Dr Mahathir brought Malaysia further modernisation and rapid economic growth.

Prominent Protest Events in Malaysia

Postill (2014) characterised the *1998-1999 Reformasi*, the *Electoral Tsunami of 2008* and the *Bersih* protest events as the key moments of internet activism and social protest in Malaysia. In this section, protest events in the country are described in more detail after being divided into five prominent key themes: (1) Pre-independence era, (2) Early post-independence, (3) The *1998-1999 Reformasi*, (4) The *Electoral Tsunami of 2008*, and (5) *Bersih.*

In the pre-independence era, the biggest protest occurred from 1946 to 1948 throughout Malaya, when all the Malays opposed the establishment of the Malayan Union. The Malays, who are the native people, refused to accept the idea of the Malayan Union for several reasons, mainly citizenship and the reduction of the power and rights of the *Sultans*. Large-scale protest movements by the Malays was followed by effective negotiation, causing the British to withdraw the establishment of the Malayan Union in 1948.

The early post-independence era began with the resurrection of the student movement. On 22 April 1974, a large protest was recorded. The protest was held by students of the Institut Teknologi Mara (ITM). who demanded that the government recognise their qualifications. About 6,000 students marched to the parliament building, and some of them hijacked a train at Padang Jawa station near Shah Alam and drove themselves to Kuala Lumpur.

The *1999-1998 Reformasi* was another large-scale protest rooted in the *reformasi*[20] movement of September 1998 (Smeltzer & Paré, 2015). The dismissal

[20]*Reformasi* is Malay word for "reformation" in English

of deputy prime minister Anwar Ibrahim from his post due to his sexual misconduct (Zain et al., 2015) angered his followers, thus beginning the reform movement. Within 18 days after his dismissal, Anwar Ibrahim employed a counter-attack by criticising the government's abuse of political power. Based on the study by Zain, Yusoff, and Othman (2015), the dismissal of deputy prime minister Anwar Ibrahim sparked considerable protest. He became the greatest critic of the government of the day through his numerous talks and rallies around the country. Hence, these incited many in society to protest as part of a reformation movement. During these rallies, Anwar Ibrahim enabled people to come together to follow his aspirations. As quoted by Weiss (1999), the fight was for justice, accountability, policies, economic development, freedom, and democracy.

This indirectly deflected all the charges of sexual misconduct and the abuse of power that had been brought against himself. The movement took to the streets as the arena of protest and, for the first time in modern Malaysia, the country witnessed the largest street demonstration since its independence (Sanawi, 2014).

The *Electoral Tsunami* of *2008* saw the creation of a new opposition alliance, *Pakatan Rakyat* (the People's Alliance), which was a coalition of Malay reformists, Malay Islamists, and mostly Chinese secularists (Liow, 2012). After Dr Mahathir retired and was replaced by his deputy Abdullah Ahmad Badawi in 2003, the election in 2004 brought remarkable success for their party, *Barisan Nasional (BN)*. However, in the 2008 election, the result was hugely disappointing for BN. Although BN managed to remain in power, its overall popular vote dipped to 51%, and they failed to win the required two-thirds parliamentary majority (Liow, 2012).

In the *Electoral Tsunami of 2008*, three separate episodes of protest were recorded. People had been voicing their dissatisfaction with the government since late 2007. Postill (2014) noted that in September 2007, the Malaysian Bar Council led 2,000 lawyers and activists to hold a protest march, "Walk for Justice", in Putrajaya. This was initiated by the Malaysian Bar Council to promote judicial

reforms, call for an investigation into judicial corruption, and, ultimately, demand accountable institutions, fairness, and anti-corruption. Two months later, on 10 November, the first *Bersih* Rally occurred at Dataran Merdeka, Kuala Lumpur to protest against corruption and demand electoral reform. The turnout was estimated at 10,000 to 40,000 people. This was followed on 25 November by a gathering of 20,000 to 30,000 people outside the Petronas Twin Towers at midnight until early Sunday morning. This protest was led by the Hindu Rights Action Front (Hindraf), a coalition of thirty Hindu NGOs, which was protesting against discrimination. Of these significant episodes of protest, the most renowned of the present-day Malaysian protest movements is the Coalition for Clean and Fair Elections, commonly known as *Bersih* (Smeltzer & Paré, 2015).

The foundations of *Bersih* involved Datuk Ambiga Sreeneevasan, a former president of the Bar Council, who won the International Women of Courage Award in 2009. She formed the Coalition for Clean and Fair Elections in 2007, comprising 84 non-governmental organisations. The study by Sanawi (2014) reiterated that the authorities were warned that a political rally, also known as BERSIH,[21] involved more than 40,000 people marching into Kuala Lumpur. Sanawi (2014) listed eight objectives that the rally demanded from the government:

1) Clean the electoral roll,

2) Reform the postal ballot,

3) Introduce the use of indelible ink,

4) Introduce a minimum 21-day campaign period,

5) Grant free and fair access to the media,

6) Strengthen public institutions,

7) Stop corruption,

8) Stop dirty politics.[22]

There have been a series of five *Bersih* rallies, including in 2007 (*Bersih*), 2011 (*Bersih 2.0*), 2012 (*Bersih 3.0*), and 2015 (*Bersih 4.0*). The latest rally was

[21]*Bersih* is Malay word for "clean" in English. It is a short form The Coalition for Clean and Fair Elections. They are non-governmental organisations (NGOs) which seeks to reform the current electoral system in Malaysia to ensure free, clean and fair elections

[22]http://www.bersih.org/about-bersih/bersihs-8-points/ - retrieved on 12 April 2016

held on 19 November 2016 (*Bersih 5.0*) and was attended by former Prime Minister Dr Mahathir Mohamad, Muhyiddin Yassin,[23] and Mukhriz Mahathir.[24] In response, the pro-government group *Gerakan Merah*,[25] led by Dato Jamal Yunos, also conducted a rally on the same day to confront *Bersih* but to no avail.

In her study, Welsh (2011) recorded that the effect of BERSIH resulted in giving the opposition an improved status and ensuring that political reform could occur. Her similar study argued that this has brought about developments in political features, which were described as follows:

> 1) The movement was successful in making use of social media platforms "to distribute information, counter government-controlled media and mobilise and organise its supporters" (p.2).
>
> 2) One success of BERSIH was its ability to arouse awareness. It is also able to influence the multi-ethnic members of society in a way that cuts across diverse groups. In such a condition, the government of the day was unable to condone this division in society nor stop them from creating any forms of protest (p.2).

Large-scale protest movements promoting an agenda of political reform is not new in Malaysia's political environment. This indirectly shows that Malaysians have the freedom to express their opinions. Perhaps one of the key reasons for this phenomenon is that Malaysians have the full right to obtain information, especially from the internet. As part of the Multimedia Super Corridor concept (a project to connect the capital, Kuala Lumpur, to the new "smart-city" of Cyberjaya via high-speed broadband networks), the government signed a Bill of Guarantees, in which it committed not to censor Internet content. For that reason, some scholars have stated that this assurance has led to the rapid development of anti-

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[23] Prime Minister Najib Razak reshuffle the cabinet on 28 July 2015, and dropped MuhyiddinYassin from his position as Deputy Prime Minister. The dismissal came after Muhyiddin had made public and critical remarks about Najib's handling of the 1Malaysia Development Berhad scandal.

[24] Expelled after criticize Najib's administration, further- https://www.bloomberg.com/news/articles/2016-02-03/mahathir-s-son-ousted-as-malaysia-premier-tightens-grip-on-power

[25] *Gerakan Merah,* is Red Movement in English.

government websites and a speculation crisis (Gainous et al., 2015). The transition of the Malaysian online environment is highly significant for social movement activities (Postill, 2014). The development of ICT might offer new opportunities to social movements in modern Malaysia. The following sub-section discusses recent protests in Malaysia.

Protest in Malaysia

Malaysia is not a country that prohibits social movements or freedom of expression. People have the right to express their feelings and thoughts by following safety regulations prescribed by the authorities. [26] Many demonstrations and protests have taken place since Independence. However, these events have not always been systematically recorded. In this research, a database was developed by manually recoding the raw police reports on protest into a data matrix. The main sources for the reports was the police officers themselves (they have a reporting duty), but a report also can be made by anyone. There are advantages and disadvantages with this database. One advantage is that it is comprehensive. For example, a report details the number of participants in a protest, the name of the main actors, the organiser, the time, and the location, among others. Police reports are also considered free from exaggeration or biased interpretation from third parties who might have certain points of view (e.g., media outlets or political news portals). However, this database also has downsides. For example, it relies solely on the police record. If a protest event was not recorded in the police report system for some reason, it would not be included in the database. Another problem is the infrequent updating of the database due to the lengthy bureaucratic process. These matters are discussed at length in the following chapter.

The police report system holds data for ten years. Data from the Royal Malaysia Police shows that in the past decade (2007-2017), 243 cases of protest were recorded. In that decade, the number gradually increased from seven to 35 protest events per year throughout the country, which cover various issues and

[26] Article 10 of the Constitution of Malaysia, http://www.agc.gov.my. Retrieved on 6 February 2020

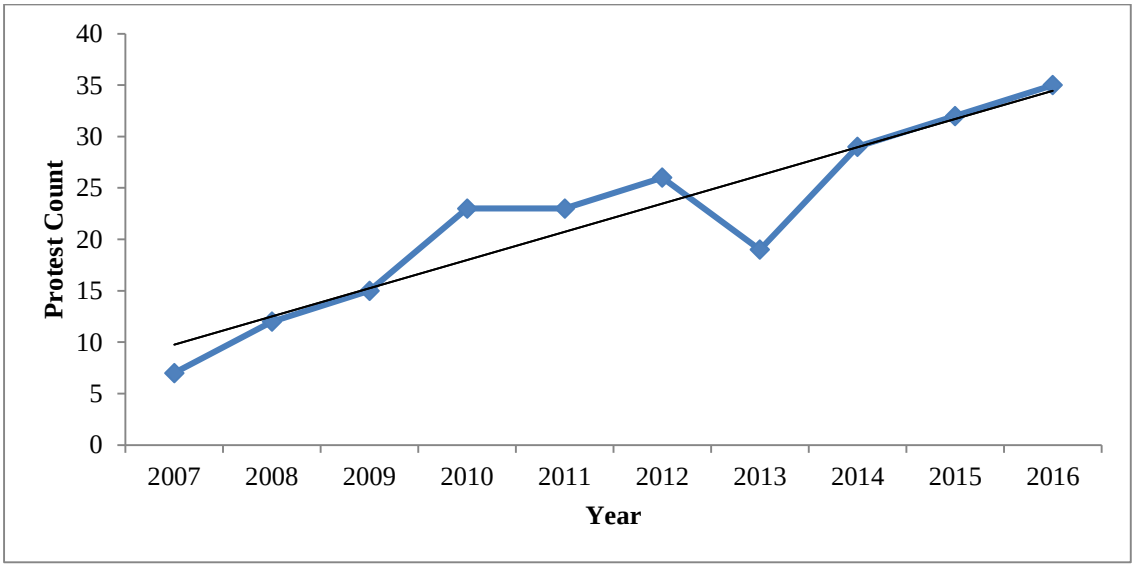
themes. From the total number of protests, 221 incidents were organised by opposition parties and social movement groups to target the government of the day. Table 2-4 presents a detailed protest breakdown by states:

Table 2-4: Protests by Year for Each State in Malaysia

Year / *States*	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	**Total**
Johor	0	0	0	1	0	5	2	6	9	8	31
Kedah	0	0	3	1	1	0	0	0	2	4	11
Kelantan	0	0	2	1	4	6	7	2	1	3	26
Pahang	0	0	1	1	2	4	2	5	3	10	28
Perak	0	0	0	2	1	0	1	0	0	0	4
Melaka	1	2	0	0	2	0	1	1	0	0	7
Negeri Sembilan	0	4	2	2	0	0	1	0	0	0	9
Perlis	0	0	0	0	0	1	0	0	0	1	2
Pulau Pinang	0	1	0	3	4	2	2	1	2	2	17
Sabah	0	0	0	0	1	1	1	2	3	0	8
Sarawak	0	1	0	0	2	0	0	0	0	0	3
Selangor	2	0	1	2	0	1	2	3	4	3	18
Terengganu	0	0	3	3	3	5	0	3	1	1	19
WP Kuala Lumpur[27]	4	4	3	7	3	1	0	6	7	3	38
Total	7	12	15	23	23	26	19	29	32	35	221

Note: The table shows the breakdown details of protest by states in Malaysia from 2007 to 2016. The lowest number of protests was recorded in the state of Perlis and the highest number was in Kuala Lumpur.

Figure 2-13: Protest Frequency in Malaysia from 2007-2016



Note: The X axis represents time in years. The Y axis is the number of protests in a particular year.

[27] For WP Kuala Lumpur until May 2017, there have been 8 protest events recorded

Figure 2-13 shows the rising trend of protests in Malaysia from 2007 to 2016. Most of these protest events occurred in urban areas with a population of more than 10,000 people. In every state in Malaysia, protests usually occur in cities even if the issues concern rural areas and minorities. Social movements/protest organisations arrange to bring protesters/participants from villages or rural areas to urban areas (by charter bus or convoy, for example). Social movement groups do not stand alone since they use an integrated network of non-hierarchical social linkage among the participants and have a shared understanding of identities and opponents (Gerlach, 1999, 2001). This means movement groups in Malaysia are integrated through their shared common features such as their agenda, purpose, and opponent. Today, this is facilitated by the new communication technologies.

A group of protest is also frequently opposed by other groups of people, particularly when the protest involves a political agenda. For instance, when a protest is supported by opposition political parties, pro-government groups also tend to organise a counter-mobilisation [28] to display their support for the government. Such scenarios lead to increasing numbers of protest events and disputes in the online and offline media.

In terms of laws and regulations, the Peaceful Assembly Act 2012 was introduced in that year and replaced Section 27 of the Police Act 1967. According to a government statement, the Act allows citizens to organise and participate in assemblies peacefully and without arms, subject to restrictions deemed necessary and in the interests of public order and security.[29] An extract from an online source argued that although the amended bill was introduced, it seemed to benefit the police and the Home Ministry. The Act stipulates that any form of gathering requires the organiser to conform to the law. The assembly has to ensure that any form of disrespect or disturbance to public peace must be avoided. This report also stated that anyone in a gathering is obliged to follow the rules and regulations

[28] http://thediplomat.com/2016/10/will-malaysias-red-shirts-become-a-political-force/ - retrieve on 10 June 2017

[29] http://www.theborneopost.com/2011/11/23/peaceful-assembly-bill-2011-tabled-for-first-reading/ - retrieve on 10 June 2017

of the authorities. Among these are age stipulations: the organiser must be 21 years old or above, while the participants must be 15 years old or above. Another rule states that the police are to be held accountable for ensuring law and order is not compromised. They are also empowered to curb social misbehaviour through arrest.

Ironically, replacing the old law with the new act become a contributory factor to the rise of protests in Malaysia. For example, when the police arrested Maria Chin Abdullah[30] a few days before the *Bersih* 5.0 rally (which occurred between 21 and 28 November 2016), this sparked further protests all over the country. People gathered in front of police departments and public places to show solidarity and protest against her police detention. This also means that certain key actors play a major role in mobilising and accelerating movements, which appears to make protest in Malaysia more like a top-down process. There are also grassroots movements but these focus more on environmental issues. For example, the Lynas and Bauxite protests in Pahang were examples of the bottom-up type of protest. Members of the community organise themselves and take responsibility in response to the authorities' actions that destroy the environment and disrupt their everyday life.

Although Malaysia is said to be a hybrid country, that is, neither a purely democratic nor purely autocratic system (Slater, 2012), protest is not a restricted activity or a theme absent from Malaysian society. Malaysians have long used their freedom of speech to criticise the government. Based on the aggregate temporal increase in protests and the spread of ICT access, one might assume that there is an association between these two factors. The following chapter reports an empirical investigation of this relationship using a rigorous empirical design that relies on subnational variations over time.

[30] Malaysian activist, key actors in organizing *Bersih* rally.

2.4 Conclusion

The rapid growth of ICT in Malaysia has allowed interpersonal communication and information transfer to happen more rapidly. It is also an important source of information for people to obtain knowledge that encompasses current affairs, sport, products, health, fashion, and many others.

Today, the internet is a highly influential tool for assisting people to make complex and high-risk decisions (Hernández-Méndez et al., 2013). This growth of technology has indirectly demonstrated its significant role in the daily life of Malaysians. It has also become imperative to use it in political activities. As communication becomes more effective and efficient, people have more opportunities to state their will and reprimand the government via online or even offline activities.

This study explores how ICT development affects protest occurrence in a specific context, which is Malaysia. Previous studies have investigated the implications of ICT from a broad perspective but did not specify a context. Furthermore, those studies also failed to examine the effects of technologies on political behaviour. Hence, utilising Malaysia as the specific context for this study has several advantages. For instance, as coverage expands and services are upgraded, the number of people with internet access is continuously growing. This means, however, that some areas/locations have still not yet received these upgraded technologies. For example, people in some rural areas are still using a basic GSM connection while waiting for the connection to be upgraded to one that gives them better internet access. This scenario offered a major opportunity for this research. These conditions were highly suited to the current study as they allowed before and after comparisons, which were performed to identify the effects of ICT on protest activities in a naturalistic environment.

Returning to the topics of protest and ICT development from the previous sub-section, the number of protests has rapidly increased, as have improvements in ICT. Recent trends suggest that protests are occurring far more quickly and the extent of their mobilisation has tremendously increased. The ongoing growth of

extra-institutional activities cannot be ignored. The emergence of new forms of online communication such as social media sites, cross-messaging, and many other online platforms may contribute in part to the political implications in Malaysia. In general, from the upward trends in both protest activity and ICT technology, it might be concluded that there is a positive association between ICT development and increased protest activity. However, aggregate trends can be misleading as changes to protests and ICT might be unrelated or negatively associated at the subnational level. Hence the justification for exploring this matter in more detail in order to determine the extent of any coherent connection between ICT and protest. In the following chapter, this relationship is investigated at the subnational level using a rigorous empirical research design.

2.5 Appendix

Table 2-5: Malaysia Development Plans

Development Plan	Year
First Development Plan of Malaya	1956 - 1960
Second Development Plan of Malaya	1961 - 1965
First Malaysia Plan	1966 - 1970
Second Malaysia Plan – Introduction of New Economic Policy until 1990	1971 - 1975
Third Malaysia Plan	1976 - 1980
Fourth Malaysia Plan	1981 - 1985
Fifth Malaysia Plan	1986 - 1990
Sixth Malaysia Plan	1991 - 1995
Seventh Malaysia Plan	1996 - 2000
Eighth Malaysia Plan	2001 - 2005
Ninth Malaysia Plan	2006 - 2010
Tenth Malaysia Plan	2011 - 2015
Eleventh Malaysia Plan	2016 - 2020

Note: After the merger of Sabah and Sarawak in 1963, the Five-Year Development Plan was renamed the "Malaysia Plan".

Chapter 3

CALLING TO PROTEST: EVIDENCE FROM MALAYSIA

3.1 Introduction

In 2001, thousands of Filipinos were angered by the action taken by the Philippine Congress when it voted to set aside key evidence against Joseph Estrada on 17 January of that year. Within two hours of the decision, thousands of angry Filipinos came together on Epifanio de los Santos Avenue, an important intersection in Manila, to protest against the Congress ruling.

The protest was arranged, in part, using the forwarded text message "Go 2 EDSA. Wear blk" and by eLagda.com.[31] This was a web-based initiative to demand Estrada's resignation through an electronic signature campaign. The crowds quickly grew; over a million people arrived in the next few days, causing terrible traffic in Manila. Such a massive and rapid awareness among the people caused the country's legislators to reverse the decision, allowing the evidence to be presented and the legal action that had been taken against Estrada. This major protest was made possible by information communication technology, which facilitated public coordination. The event marked the first time that social media had helped to bring down a national leader (Shirky, 2011). Estrada himself blamed "the text-messaging generation" for his downfall (Sarsanedas, 2011, p. 1).

Arugay (2005) stated that the advancement of information and technology created an avenue for a public information exchange, particularly with the Estrada case. Moreover, this technology has become an instrument for "societal accountability as it mobilised its constituency separated by time, developed

[31]"Lagda" is a Filipino term which means signature.

agendas for political participation and collective action, as well as generated public pressure on powerful politicians" (p.14).

Today, the public is no longer bound by ideas presented by the authorities through the media.[32] People knew what to do; they can pick up their phones and search for actual news. Alternatively, if the public are concerned about a certain important issue or event, they are no longer passive readers but now sources of information. For example, to raise any issues concerning the authorities or other matters, anyone can go to the scene, take pictures, make comments, craft a headline and share the story with the entire world.

Digital connectivity is becoming more important in many respects, from food to medical aid, donations, and promotions. Everything can be organised using this new technology (Lehmann, 2015; López & Sicilia, 2014). ICT helps people to regain their rights to the information they are supposed to know; more interestingly, ICT mobilises information into action.

Many other protests have happened consecutively across the globe, such as the Occupy Movement, the anti-government demonstration in Russia, and protests in Egypt, Iran, and Ukraine, to name only a few. Undeniably, there have been protests since before the introduction of mobile internet technology. The drastic increases in the number of worldwide protests and the rapid growth of telecommunication technology raise certain questions: are these scenarios just a coincidence or they are correlated? Does protest onset have any association with information and communication technology (ICT)? And, if so, how does ICT help to mobilise a protest?

Diamond, Palfrey, Rohozinski, and Zitrain (2010) stated that this *liberation technology* is capable of helping oppressed groups worldwide. Current ICT tools like mobile phones and the Internet offer two-way, multi-way, and mass communication that helps people to break free from autocratic rules. However, the evidence presented by Rød and Weidmann (2015) indicated that ICT

[32] As has been described in Agenda-Setting theory founded by Dr. Maxwell McCombs and Dr. Donald Shaw, 1972.

development has more likely benefited autocratic leaders as they can monitor and gather information about the population so that they can plan the necessary actions to strengthen their position. This debate highlights that the impact of ICT on social movements remains unclear.

This paper examines whether the development of communication technology has an effect on extra-institutional activities by focusing on the association between communication network technologies and protest onset. In terms of the empirical strategy, the analysis was conducted using fine-grained protest data and focusing on one specific study context, Malaysia. It is argued that the growth of the internet has caused the number of protests to rise as the internet allows collective action problems to be overcome and facilitates coordination. To demonstrate this, the analysis was based on two major data sources, firstly, a protest event database taken from police reports and, second, data on mobile communication technologies. The latter involves information about the GSM/2G (Global System for Mobile Communications) and 3G (third generation of wireless mobile telecommunications technology) coverage of Malaysia.

Most of the existing literature has identified positive and significant links between protest and communication technology; however, the empirical evidence has omitted two main aspects. First, most studies focused on GSM technology but disregarded 3G as a powerful technology. Second, some weaknesses are evident in the data from the global datasets used. A fine-grained protest dataset for Malaysia is introduced, which was gathered from police reports from 2007 to 2016. In the regression analysis, the fixed effects regression model was applied to analyse how the internet has affected protest onset, while the economic effect was controlled using night light emission data. Remarkably, the results generated offer no clear evidence of an association between the internet and protest onset. The factors contributing to the results are further explained in the discussion chapter.

3.2 Literature Review

Numerous studies have attempted to explain the role of ICT in protest onset. This section briefly discusses the ICT developments that have enabled public internet access and the ongoing debate on the role ICT plays in protest activities. Finally, the section describes the limitations of the existing empirical research and contributions.

As the internet enables more mobile phone functions, the forms of information are becoming more interesting and now include videos, photos and many more. The two most prominent communication technology networks worldwide are Global Systems for Mobile communication (GSM) and Third-Generation Wireless Mobile Telecommunications Technology (3G). GSM is currently the most widely used standard for mobile phones while 3G[33] is the next generation of mobile technology. GSM offers basic mobile communication capabilities like voice calls, text messaging, and basic internet access.[34] 3G is a new technology that was introduced to replace GSM. It offers substantial improvements over GSM in almost all respects, especially internet access. 3G networks provide 384 Kbps.[35] This is already within the range of DSL (digital subscriber line)[36] speeds, which can extend up to 7.2 Mbps. This is significantly quicker than GSM. Faster data transfer speeds enabled the addition of several new features that were unavailable with GSM, such as video calls, internet application platforms, social media, and many more. This communication development has allowed people to experience new ways of communicating and interacting at minimal cost.

[33] Currently there are rapid growth of coverage for 4G and 5G technology in Malaysia. I do not specifically include this advance internet capability in my study. I am focuses on the minimal internet connection which is 3G.

[34] Improvement of GSM by introducing GPRS and EDGE which are extended capabilities of GSM networks allowing user to send and receive Multimedia messaging such as low resolution pictures, audio clips, and even short video clips. This improvement is too minimal to access the internet content.

[35] kBps is unit data transfer rate, kilobyte per second.

[36] Also known as connection from fixed telephone line

ICT has become one of the prominent sources of public information worldwide, and it involves many layers of citizens, such as the regular public, activists, business/trade owners, non-governmental organisations, and governments (Hettiarachchi, 2007). Studies of ICT's impact on politics have become increasingly popular as they enable a better understanding of the impact of ICT and strengthen the ideal shape of democracy (Dahlgren, 2005). ICT provides a new platform for the public to access political information. Internet use is associated with greater citizen commitment to democratic governance (Kahn & Kellner, 2004; Nisbet et al., 2012). Citizens can now easily obtain information on political campaigns, views, and discussions via the internet, which should positively promote political participation (Yamamoto & Kushin, 2014). The availability of the internet also amplifies popular opposition to corruption, as well as demands for state accountability (Arif, 2014). Hence, social media interaction platforms such as Facebook and Twitter have become prominent information hubs through which citizens can monitor their government's wrongdoings (Jha & Sarangi, 2014).

Besides creating a political information hub, ICT also seems to play a role in protest activities. In the context of such protest activities, a study by Valenzuela et al. (2014) investigated the relationship between the use of social media and displays of social unhappiness with regard to the increasing dissatisfaction among youths in Chile. Their results seem to indicate that social media platforms, namely Facebook and Twitter, created marked consequences that led to protest (p. 2056). Meanwhile, Breuer, Landman, and Farquhar (2015) studied how social media acted as a platform for protest mobilisation during the Tunisian revolution in late 2010 and early 2011. Their findings show that ICT became an essential resource for the mobilisation of the nationwide anti-regime protests.

As the communication landscape becomes more obscure and complex, it should enhance the opportunities for the public to become engaged with information. Engaging with new, broader information might affect the thoughts or attitudes of the people, which is the primary interest of current researchers. In recent studies, ICT has been argued to play a central role in protest onset as it increases the ability to undertake collective action (Shirky, 2011). Farrell (2012)

indicated that the Arab Spring has become a prominent case study of the transformation of the state via ICT. In the Egyptian revolution, the participants credited the role of ICT in coordinating the protest and informing the world (Aker & Mbiti, 2010; Howard & Hussain, 2011). The capacity of ICT to support freedom means it has become an important channel used by the public to fight for their cause (Lim, 2012).

Castells et al. (2007) stated that the new media functions most significantly as a vehicle for the mobilisation of existing youth networks. This has given rise to special interest or advocacy groups, which formed a natural political power. There is some evidence from developed and developing countries suggesting that people who engage in civic and political activities—including protest behaviour — are those who frequently use the internet (Valenzuela, 2013). In the context of an authoritarian regime, the uses of ICT have contributed to political change, whereas new sources of information could not easily be controlled by the regime (Tufekci & Wilson, 2012).

On the other hand, it is also important to note that with the benefit of the connectivity expansion, authoritarian regimes or states can also obtain information on protest. The authorities can identify everyone, making it easier for them to take action and resulting in fewer protests. In authoritarian countries with rapid internet development, the state positively promotes a semblance of transparency but in fact monitors and stifles dissent (He & Warren, 2011). A study by Hassanpour (2014) stated that insurgent action can be hindered when there is mass communication development and full connectivity to social media, whereas new technology could provide a greater awareness of the risks involved in protest, discouraging people from taking part in a demonstration.

Other studies have also found a contradictory association between protest and ICT. A study by Quintelier and Vissers (2007) stated that youths may spend more time online but they do not spend much time on offline politics (p.13). The sample included over 6,330 youngsters in Belgium and shows that exposure to ICT did not affect their inclination to participate in political activities. Little (2016) stated that general technological developments increase the average level of

contempt for a regime, whereby social media enables everyone to express their opinion about the regime. However, this does not necessarily contribute to higher protest levels because negative and positive opinions have an equal chance of influencing the public.

Rød and Weidmann (2015) conducted an extensive study on authoritarian countries between 1993 and 2010. From their findings, they conclude that little evidence existed to support the claim that ICT development plays a role in bringing about extra-institutional political change. In their recent publication, they found that ICT does not enable protest, but prolongs and accelerates the mobilisation effort (Weidmann & Rød, 2019b).

There is ongoing debate about whether and why ICT development has a causal effect on protest. One key to measuring the effect of ICT development on protest onset is to use information about the types of technology and their coverage.

To access the internet via a mobile phone, the minimum coverage quality is 3G. Expansions of 3G coverage have enabled more citizens to access the internet (mobile internet). With regard to a direct relationship between the internet and protest, information about a protest can now be widely broadcast. Any movement or repression from the government can be recorded and shared instantly with many other citizens. This makes it riskier for the government to take any repressive action, while ICT enables them to monitor the public. This is the study gap that this paper intends to bridge, as most of the existing studies only focus on GSM data.

Pierskalla and Hollenbach (2013) contended that the availability of district phones as a form of communication technology improves group coordination and allows the collective action problem to be overcome. Essentially, the independent data used in their study included the coverage expansion of GSM connectivity. Their results showed that the availability of district phone coverage significantly and substantially increases the probability of violent conflict. Similarly, Christensen and Garfias (2018) contended that as new technology expands, more people have access to the internet, which was found to increase the probability of

protest by over half of the mean. Studies by Manacorda and Tesei (2019) were based on the development of ICT from 1998 to 2012 on the African continent. Their results showed that the spread of ICT significantly contributes to political mobilisation. Another recent study by Fergusson and Molina (2019) stated that under certain conditions, the development of ICT has a significantly positive impact on citizen protests.

The findings of these recently published articles point in the same direction: ICT has positive effects on coordination and protest.

However, some studies showed otherwise. Weidmann (2016) pointed out that these results might be misleading as the quality of data on political violence is frequently based on media reports, which can lead to reporting bias. On the other hand, a study on district phones and insurgent violence in Iraq by Shapiro and Weidmann (2015) found that the expansion of mobile communication reduced the frequency of violent attacks by insurgent forces.

Hence, the contribution of this study encompasses the following themes. First, it is theorised that GSM and 3G have a differential effect, whereby not only GSM coverage is measured but also 3G coverage. 3G allows the use of the internet and social media, which might have particularly beneficial effects on coordination as this enables communication between and among many people. Second, it is argued that the effect of 3G should be greater due to its internet access facility. Third, high-quality protest data was used, which involved no accuracy issues compared to the global protest data used by Pierskalla and Hollenbach (2013) as well as Christensen and Garfias (2018). The data gathered from police records is likely to be more precise and not suffer from duplication issues, compared to the global protest database that was developed from media coverage reports. Fourth, a specific unit of analysis was used: the district. This is a more natural unit of analysis than grid cells. Examining districts is logical because when protests happen, they tend to occur in the nearest large urban area, for example, a district capital. Examining the technology coverage of the district means there is less misalignment between protest and coverage.

3.3 Communications Development and Protest

Under a broad spectrum, communication has the power to form and sustain social movements of various and substantial purposes and objectives (Gitlin, 2003). Social movements are part of the democratic function (Porta, 2013), so the role of communication is crucial in determining a social movement's objectives and the significant goals of the people involved in a particular social movement. With the constant impact of new technologies creating new communication landscapes, online communication has become fundamental to the activities of global social movements (Donk, D.Loader, G.Nixon, & Rucht, 2004: 72). Consequently, conventional communication media, especially journalism, have faced new challenges, partly since new technologies have enabled their audience to shape their own narratives and expressions in the online world (Robinson, 2011). The extensive effect of communication technology has received substantial academic attention (Donk et al., 2004). It also provides a cost-efficient medium, enabling protest movements to mobilise their strength, coordinate direct action, and facilitate the spread of information to society (Cammaerts et al., 2013).

Today, we live in an age of protest. Protests challenging the status quo happen on campuses, public squares, streets, and social media platforms. Mobilising people to protest begins by sending a message to the public, which is initially an invisible action that aims to change hearts and minds. Referring to Gillion (2013), protest is a way of delivering information to create and share a narrative that influences others. Without sufficient information, the coordination involved in mobilising a protest will fail.

Many studies have examined whether ICT development is a powerful tool for physical collective action. However, there are few studies of the role of communication in collective action settings, so the actual role of new communication development has not been accurately measured.[37]

[37] The following chapter will explain in greater detail on collective action problem.

In *The Strategy of Conflict*, Schelling (1980) discusses a scenario in which a meeting place is an example of a coordination problem. A coordination problem is largely a lack of or insufficient common information, which everyone would need if coordination were to be achieved. However, possessing limited information would mean they may not know how to do this. Many studies focus more on collective action, particularly in political protest research (Brandstätter & Opp, 2014; Christensen & Garfias, 2018; Klandermans & van Stekelenburg, 2013; D. A. Siegel, 2011), whereas the coordination problem actually deserves more attention because the key to mobilising a protest is information.

Successful coordination requires shared information regarding the nature of the problem and its solution (Cronk & Leech, 2013). A coordination problem generally happens when people do not know what to do without knowing what others are doing. In this setting, mutual or common knowledge is important for accomplishing coordination (Rubinstein, 1989). Each individual will not participate in a protest unless everybody (or at least a large number of people) participates. Coordination is necessary to build a foundation of a major protest. The participants might avoid joining the protest if they lack the knowledge about the actions of everybody else. The core issue in the coordination problem is how a protest is mobilised and coordinated. Communication is essential in coordinating behaviour, thus, the role of communication here is vital.

If someone plans a protest, he wants his fellow citizens to know about his plan. By informing others about the plan, more might want to participate. Some common coordination dilemmas faced by participants are: Who else is going? What will others do? and do they also know about this? Knowing what to do in this situation requires the knowledge of what others are likely to do. Here, common knowledge is crucial: it is the key to solving the coordination problem (Christensen & Garfias, 2018; Cronk & Leech, 2013).

As a protest is risky, clear information is required to aid the coordination. Messages about the protest should be transmitted to other citizens, while obtaining feedback from others is also important in coordination management. GSM only allows minimal information dispersion, such as one-to-one or one-to-

two. It is difficult to deliver a message to a larger group in this way. Current communication technology allows the public to access the internet on mobile devices. The minimum 3G connection enables people to access social media, allowing messages to be transmitted from one to many or even many to many. This also allows people to see and determine the credibility of the source (i.e., the person who posted the information). This accessibility makes communication much easier, quicker, and more effective. It creates common knowledge about people's actions. The information regarding the protest can be easily shared and posted not only at the individual level but also the aggregate level, as well as in real time across geographical boundaries.

It has been demonstrated that the pace of communication development has a positive correlation with extra-institutional activities (Pierskalla & Hollenbach, 2013; Christensen & Garfias, 2018). These results were mainly derived from GSM technology, which is limited in its information dispersion capacity. Compared to GSM, 3G connections provide additional communication capabilities. As discussed above, 3G allows not only one-to-one but also one-to-many and multiple bidirectional interaction. It also allows actors to observe other people in their network in real time. For instance, social media platforms allow users to see 'likes' and 'shares' with regard to any message. This advantage is the key to solving the coordination problem: common knowledge can be achieved more easily and efficiently. It is contended that differences in network capability would result in different outcomes. Based on previous research and the differences between the GSM and 3G technology, three distinct hypotheses were developed with regard to the impact of these technologies on the onset of protest.

Firstly, it is argued that mobile communication technologies efficiently assist the coordination of protest mobilisation. They reduce the coordination costs and allow information about a protest to be shared quickly among citizens. For instance, mobile communication allows the sharing of locations, information on repression, pictures, videos, and many other details in real time. This will reduce people's uncertainty about whether to participate in the protest (Christensen & Garfias, 2018). Mobile communication technology enables coordination by providing information about the actions of others. This results in the paper's first

hypothesis: an increase in mobile network coverage will result in an increase in protests.

Secondly, the most important factor to consider when joining a protest is safety, which is a function of crowd size. If 100,000 people go to protest, this limits the relative impact of the state's response on the individual and the chance of any single protester being arrested or hurt is minimal. However, if only a few people arrive, the risk of being arrested or hurt is significantly larger. Hence, the extent to which mobile communication technology increases protest onset should be mediated by the number of people with access to this technology. The more people know what others are doing, the greater the impact of information on the network with regard to coordination. This led to the paper's second hypothesis: the greater the number of people with access to mobile communication technology, the greater the positive relationship between mobile communication technology and protest onset.

Thirdly, the effect of mobile communication technology on protest should be considerably stronger with the expansion of 3G coverage, as 3G enables the use of the internet and social media platforms (e.g., Facebook, Twitter and Instagram). The 3G network allows people to see real-time updates of an event, popular approval and disapproval, how many people engage with a page, and many more details. GSM fosters coordination via text messaging and the ability to call, but 3G coverage allows internet connection, giving users low-cost access to aggregate information. This suggests that 3G is more effective than GSM in overcoming coordination problems. Therefore, this paper's final hypothesis is: The impact of mobile communication on protest onset should be greater for an increase in 3G than for an increase in GSM coverage.

3.4 Data

This study focused on a specific context, Malaysia. This subnational study assists the methodological perspective. Focusing on a single country case minimises the confounders as some contextual factors can be held as constants,

such as the legal context, the protest culture and history, as well as the historical political developments.

Much recent research now covers broader contexts (i.e., they are cross-country studies) so the researchers had to contend with the extensive heterogeneous background factor of confounders. In spite of the numerous rigorous tests, major potential confounders continue to complicate the results as they are impossible to test for with such a massive sample. Thus, focusing on one specific context makes causal inferences more manageable.

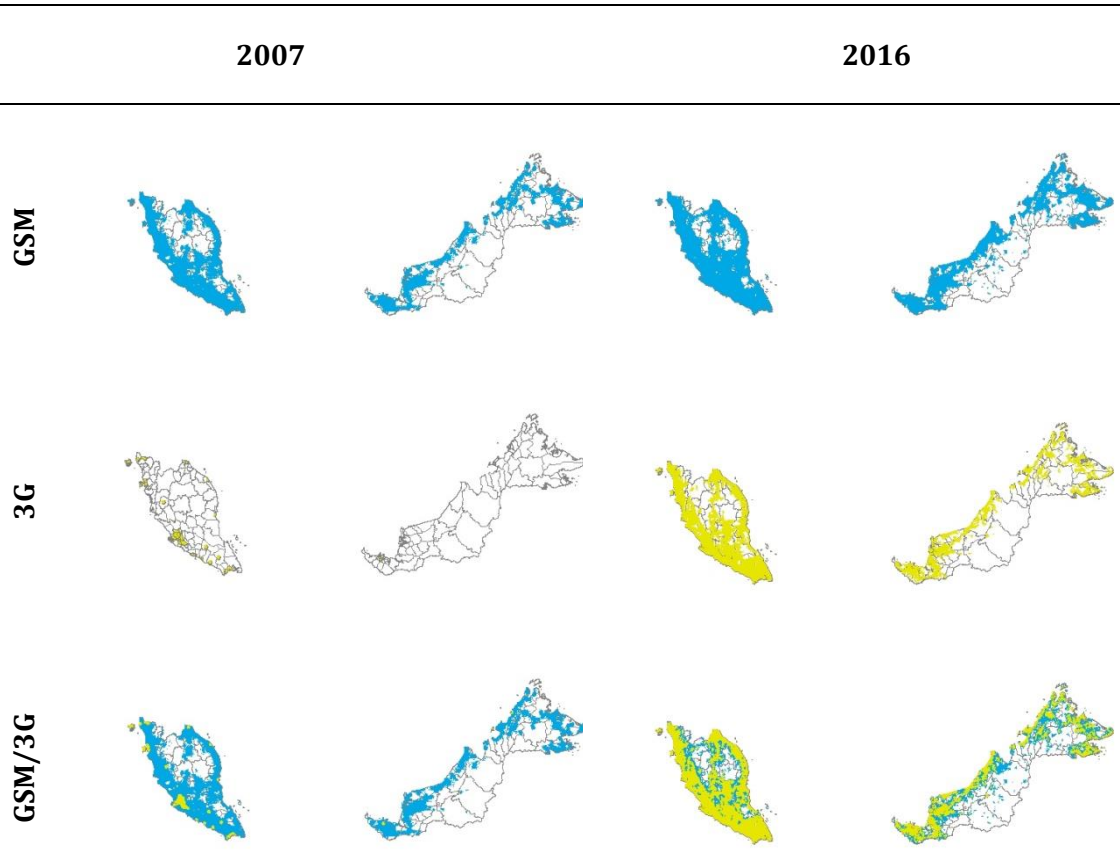
To analyse the relationship between the change in ICT coverage and protest occurrence, this study adopted a slightly different approach from previous studies to determining the areas of coverage. Districts were used, which are a more useful unit of analysis than the artificial grid cells used in previous research (Christensen & Garfias, 2018; Pierskalla & Hollenbach, 2013). A district refers a to local administrative division below the state level, so it typically covers a smaller geographical area. In total, 144 districts in Malaysia were observed over 10 years, resulting in 1,440 observations overall.

There were several reasons why the district was used as the unit of analysis. Generally, smaller units from a similar context should be more effective at holding local socio-economic factors as constants. If people are unhappy and mobilise to protest, they tend not to protest right in front of their houses, but travel at least to a local city or town to be seen and make their voices heard. Thus, grid cell units might be inappropriate in this respect. The district unit, therefore, appeared to offer a good compromise as the context was held as constant as possible while matching the local ICT coverage to local protests. As previous studies have argued, contestation may be influenced by variables such as the different interests and ideologies in a district (Aistrup, 2004; Ensley et al., 2009). Logically, this indicates that there would be more protest in certain districts as a protest is far more likely to happen in the central city of a district. Choosing the district as the unit of analysis minimised the omission of any attribute of protest and avoided a biased coefficient estimate.

Coverage Data

Following Pierskalla and Hollenbach (2013) as well as Christensen and Garfias (2018), the data on coverage progression was taken from the *Collins Bartholemew* website.[38] As one of the main objectives was to investigate how the effects differed across two technologies, the data was obtained from the two types of technologies, the GSM and 3G networks.

Figure 3-1: Expansion of Network Coverage of GSM and 3G, 2007-2016



Note: This figure is based on the Collins Mobile Coverage database. Blue indicates GSM coverage and yellow indicates 3G coverage.

Data on technology coverage was available for 2007-2009 and 2011-2016. Coverage data for 2010 was estimated using a linear interpolation of the information from 2009 and 2011 to create a balanced panel dataset for a 10-year period. Figure 3-1 shows the dramatic changes in respect of GSM and 3G networks in Malaysia. The first row indicates the network type and the column shows the

[38] Collins Bartholemew website: http://www.collinsbartholomew.com/ - retrieved on 8 August 2018

change from 2007 to 2016. The blue shading shows the GSM coverage in the country, while yellow represents the 3G network. In 2007, 3G coverage grew rapidly for those in the cities and had expanded throughout the country by 2016. The third row presents both networks in 2007 and 2016. However, in some places, there was no 3G coverage but GSM was available.

The coverage explorer only indicates the coverage of the GSM and 3G networks in Malaysia, not additional information on network providers and users. This allowed the effects of GSM and 3G to be distinguished. In areas with 3G coverage, citizens were more likely to have a smartphone as the cost of a mobile phone that could receive 3G content with a subscription plan became affordable (Behnke, 2010). Estimating the effect that coverage had on protest across the districts provided information about time variations. In 2007, the average district phone coverage (across all districts) was only 40.9% for GSM and 2% for 3G. There were rapid increases in 2016, when GSM coverage increased to 54% and 3G coverage to 37%.

The design employed for this research measured coverage in two ways: first, the proportion of an area of a district with GSM/3G coverage and second, the proportion of the population of a district with GSM/3G. The latter measure was an innovation not used in previous research, which has relied on area-based measures. While the area and population measures are likely to be positively correlated, the latter is obviously preferable since protesting is a human activity. Moreover, if people are unevenly distributed within districts, area-based measures underestimate the coverage, which would result in an attenuated coefficient estimate.

Population Data

Spatial population information was obtained from WorldPop (2018). This resource provided population data at a 100 m x 100 m resolution for 2005, 2010, and 2015, with a prediction for 2020.[39] The 2010 data was used because it fell in

[39] http://www.worldpop.org.uk/data/summary/?doi=10.5258/SOTON/WP00158 – Retrieved on 3 September 2018.

the middle of the study period (2007-2016). Ideally, annual population estimates would have been utilised, but restricting population measures to a single year was unlikely to be consequential, as population movements in Malaysia are moderate.[40] This was further supported by the high positive correlation between the 2010 and 2015 population estimates for the districts (r = 0.97).

The Existing Protest Data and Their Sources

Social movements are a highly popular social science topic, particularly in political and sociological studies. Many sources of data are used in the current protest studies. These databases have been developed from different perspectives from which to examine social movements. The approach to data collection can be divided into two categories: 1) manual coding and 2) machine automatic coding (Weidmann & Rød, 2019b). For the former, the raw information is extracted manually from the search engine using specific keywords in specific sources by a person, while the latter generally involves running a text analysis using a computer. There are advantages and drawbacks to each approach. Human coding produces high-quality data content by extracting the right information. However, this approach is highly time-consuming and costly. Machine automatic coding can be time- and cost-efficient, but the precision of data extraction can be a major issue. A machine may be able to read words but it still cannot understand actual meanings, which leads to missed code.

Table 3-1 lists some prominent databases that have been used to study social movements and protest. The cross-national times series database was developed to record domestic conflict events around the world. The main sources were derived from the New York Times (Banks, 2008). The sources for the European Protest and Coercion data are primarily gathered from the Reuters Textline Library, which covers over 400 publications, online newspapers and magazines. The news comprises global and local sources (Francisco, 2006). The UCDP Geo-reference Event was developed by the Uppsala Conflict Data Program

[40] Malaysia Country Report for the Fifth Asian and Pacific Population Conference : Population and Poverty in Asia and the Pacific, 11-17 December 2002, United Nations Conference Centre, Bangkok, Thailand.

at the Department of Peace and Conflict Research, Uppsala University (Sundberg et al., 2012). The dataset covers social unrest events throughout the world between 1989 and 2019. The main source of this database is news reporting.

Table 3-1: Existing Protest Databases

No	*Database*	*Scholar(s)*	*Main Source*	*Approach*
1	The cross-national times series database	Banks (2011)	New York Times	Manual coding
2	European Protest and Coercion data	Francisco (2006)	Reuters Textline	Manual coding
3	UCDP Geo-reference Event Dataset	Sundberg and Melender (2013)	Reuters News, BBC Monitoring, Associated Press Newswires , Agence France Presse, Xinhua, Dow Jones Wires	Manual coding
4	The Armed Conflict Location and Data	Raleigh (2010)	Local, regional, national, and continental media	Manual coding
5	Social Conflict in Africa Database	Salehyan, Idean, Cullen S. Hendrix, Jesse Hamner, Christina Case, Christopher Linebarger, Emily Stull, and Jennifer Williams (2012)	Associated Press and Agence France-Presse	Manual coding
6	Mass Mobilisation Database	Clark and Regen (2016)	Major News Media.	Manual coding
7	Kansas Event Data System	Schrodt and Gerner (1996)	Reuters	Machine automatic coding
8	Global Data Events, Location and Tone (GDELT)	Leetaru and Schrodt (2013)	Online News, Media Monitoring Agencies	Machine automatic coding
9	The Mass Mobilization in Autocracies Database (MMAD)	Rød and Weidmann (2019)	Media Monitoring Agencies	Combine manual and Machine automatic coding

Note: Different databases were developed by different scholars/institutions, who coded values and variable definitions in different ways. Each dataset has its own codebook.

The Armed Conflict Location Data (ACLED)(Raleigh, 2016) records all reported political violence and protest events across Africa, East Asia, South Asia, South East Asia, the Middle East, Central Asia and the Caucasus, Latin America and the Caribbean, South Eastern and Eastern Europe, and also the Balkans. Their primary sources of information are local and international media outlets.

The Social Conflict in Africa database covers conflict data on protests, riots, strikes, and other social disturbances in Africa, Latin America and the Caribbean (Hendrix & Salehyan, 2017). The primary source of information for this dataset comes from the media bank of the Associated Press and Agence France-Presse.

The Mass Mobilization Database was developed by Clark and Regan (2015) in an effort to understand citizen movements against governments and the government responses to overcome resistance. This data was collected from over 162 countries from 1990 to 2017. The primary sources were collected from five main newspapers: the New York Times, the Washington Post, the Christian Science Monitor, the Times of London and the Jerusalem Post.

The Kansas Event Data system was developed for a similar purpose, to monitor citizen movements against the state. The database was developed by Schrodt and Gerner (1996) and was, at the time, highly advanced as it used fully automatic coding of English language news reports. The main source of information was Reuters.

A more recent database is the Global Database of Events, Language, and Tone (GDELT). It was built by Leetaru and Schrodt (2013) to understand the global society by monitoring the world's open information stream. The advanced machine coded events are collected from various recent online news sources and extend back to 1979. The extensive use of sources from media monitoring agencies make this database immense. This database also adds spatial coordinates to events, allowing researchers to pinpoint a location.

Another recent database is the Mass Mobilization in Autocracies Database (MMAD), which was developed by Rød and Weidmann (2019). The data covers 69

countries and the period from 2003 to 2015. The sources for the database were based on media news monitoring agencies.

At this point, it is impossible to specify which database is better because all of them use/used data collected from the same sources, media reports. In comparing the quality of these databases, it is important to not only examine the data-gathering approach but also identify the data sources.

Media outlets are not meant to specifically report on social movement activities. Some protest events are not prolonged or may not involve any significant actors, so they may not seem as important nor be reported in the media (eg., a protest might happen over a short time in a small area such as a mosque). Information coming from the media has raised some issues in terms of the potential selectivity and accuracy of the news (Weidmann, 2016). Hence, the current researcher used a database of police records, which were manually coded from the raw police reports into a dataset.

Protest Data

In this study, the researcher used a database developed from police reports for the analysis, mainly in an attempt to address the shortcomings of the media source databases and provide better-quality findings. The source of this database came from an organisation that upholds national security and which is considerably free of exaggerated or unclear information. The raw information in police reports is genuine as it does not involve other parties' interpretations (such as those of media outlets) that may reveal certain points of view. Still, some bias and uncontrollable issues were unavoidable when using the police report database as the reports were recorded manually. Cases of under-reporting may occur. For example, if a police officer wants to show his superior that his custody area is under control, he might remove some protest report content or misreport certain people who were regarded as important to the police. This may not be mentioned in the report or may not be reported at all.

Misreporting some information would not affect the analysis because the main analysis used information about whether a protest happened or not. Not

reporting or removing a protest report is hard to conceal because the police cannot control the public, which might have already shared the details on social media. Overall, this possibility is not overly problematic. The data was reviewed and no obvious bias or issues that could cause a sceptical response were identified.

Police reports have a specific format for precisely reporting locations, numbers, main actors, damage, and many other variables, which may not be accessible in a media report.

The police reports were never meant to be made public and were intended only for internal police records. As this study had a purely academic purpose, permission was obtained to access their database information on protest events. Each police report was carefully read and coded into the data matrix. The data was carefully hand-recorded by the researcher following the format in the Social Conflict Analysis Database (SCAD) codebook by replicating the SCAD code-variable details.

The Malaysian Royal Police have a central database that holds information for the previous 10 years. It stores all reports from all states for many categories, such as crime, accident, fire, protest, robbery, and rape. The complete set of police report categories were limited to reports in the protest category and the database was searched using specific keywords. Synonym searches were also performed to maximise the completeness of the dataset.[41] The results were carefully read and coded into a spreadsheet.[42]

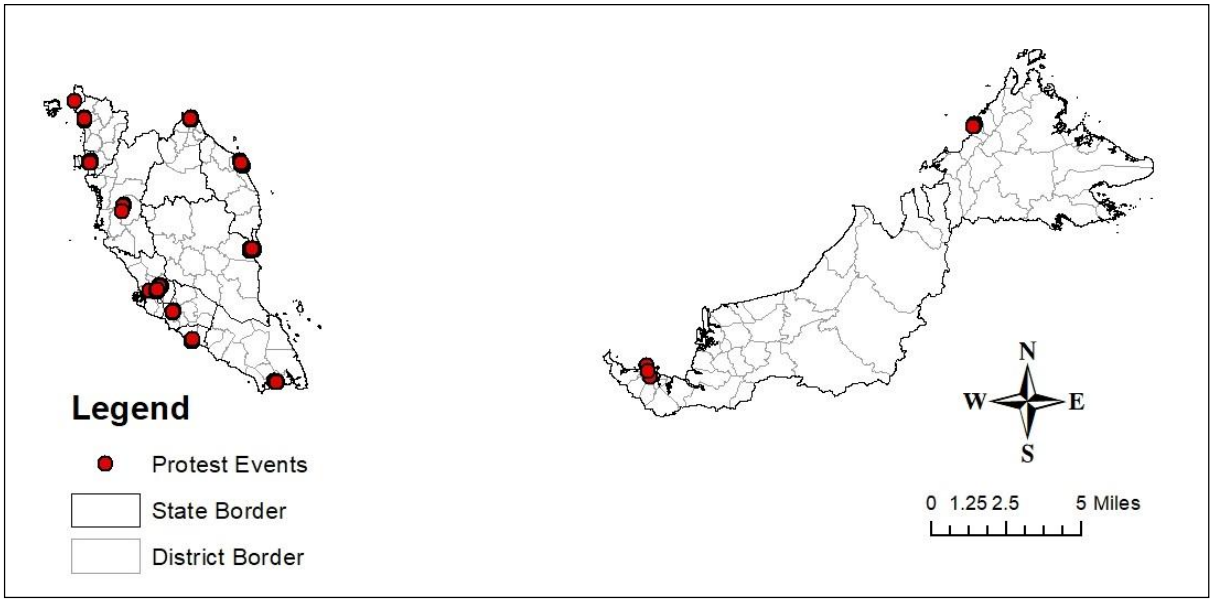
The reports can be made by anyone but are usually made by police officers as part of their duty to report. In their system, they use a report reference to avoid any duplication of a single event. The raw police reports mention details including the exact location of a protest. Then, using the names, the locations were identified manually using Google Maps. The latitude and longitude of each location were geo-coded.

[41] There are many words in Malay Language which can represent as protest. To determine the meaning of the keywords, it depends on the sentences. Therefore, sorting according to protest and its synonym keywords will maximize the quality of the data, refer Appendix A.

[42] Detail coding procedure explain in the Appendix B

Between 2007 and 2016, the police reports indicated that 221 protest events occurred throughout Malaysia.[43] They reflected a variety of issues and themes, such as governance, laws and regulations, land, salaries, the environment, sport, fuel prices, religion, workers' rights, toll prices, and solidarity. In addition, the police reports indicated that the protests emerged quickly and their scale increased tremendously. Figure 3-2 shows the distribution of protest events throughout the country for the past ten years.

Figure 3-2: Protest Points in Malaysia 2007-2016



Notes: The red dots indicate the protest locations recorded in the police report database from 2007 to 2016.

Two studies, those of Pierskalla and Hollenbach (2013) as well as Christensen and Garfias (2018), used data from the Global Database of Events, Language, and Tone (GDELT). However, significant problems affect global protest data. For instance, a computer-generated database or machine-learning algorithm could gather unrelated events or multiple recordings of the same event. Meanwhile, information from media reports on political conflict tends to geocode inaccurately, especially for events that occur in larger cities, as they do not identify an actual event site, merely the nearest city. This could result in misleading analysis and erroneous conclusions.

[43] Detail explanation in Background Chapter, page 27.

Even though the police report database utilises considerably better quality control of its content, it still contains shortcomings. There are some potential problems and disadvantages with this database. It relies solely on one source, that is, details recorded by police officers. It is possible that a protest event may not be reported, so information on that protest event would not be included in the database. For example, a protest event might last a short time and the police may not be notified. Another disadvantage is that this database is not available to the public. It is also difficult to update this database regularly due to the lengthy bureaucratic process.

The GDELT data for Malaysia from 2007 until 2013 was examined, and it was discovered that the GDELT data seemed to be under-reporting more than over-reporting events. The data seemed to reveal multiple reports of the same event. The researcher also examined the Mass Mobilization in Autocracies Database (MMA database),[44] which was developed by Weidmann and Rød (2019). The results from this database were more convincing than those of the GDELT database. However, some events were not recorded; for example, small protests were not always documented in media reports.

Table 3-2: Protest Count from Three Different Datasets Covering Malaysia

Database	*Year available*	*Protest count*	*Urban*	*Rural*
Police Report	2007-2016	221	92% (204)	8% (17)
MMA Database	2003-2012	142	84% (120)	16% (22)
GDELT Database	2007-2013	1404	56% (797)	44% (607)

Note: The protest database was also divided according to locality, i.e. urban and rural. Urban areas are classified as the district of the city centre for each state, while rural areas are those outside the city centre district.

Table 3-2 presents the data summary from three different databases based on the years covered, protest count, and area (urban or rural). Data from the police reports was available for 2007-2016, with a total of 221 protests. The MMA database was available from 2003 until 2012, with a total of 142 protests, while

[44] https://mmadatabase.org/, retrieved on 12 August 2018.

the GDELT database was downloaded for 2007-2013, with a total of 1,404 protests recorded. There was a clear variance in the difference between the protest counts and data availability in the databases.

Protest obviously occur predominantly in urban areas. In the police report database, the protests were distributed mainly around urban areas, with only 8% recorded in rural areas. The MMA database recorded that 84% of the protests happened in urban areas, with 16% in rural areas. The GDELT global database recorded that 56% of the protests happened in urban areas and 44% in rural areas. Comparing the percentages from these three databases, the police database reported a higher proportion of protests in urban areas than the media-based datasets.

A review of this suggested that there was no urban bias in police reports, but the results potentially depended more on the different use of keywords in the media-based datasets. Different sets of information/data may have been extracted, resulting in a high percentage of cases happening in rural areas. In general, computer-generated coding requires a pre-specified dictionary or a list of keywords that need to be coded. Moreover, in Malay, seven words can represent a similar meaning to 'protest'.[45] However, these words may refer to different contexts rather than a protest activity. Thus, if a real protest event occurred and the news article report used different words to those in the pre-specified dictionary, it would not be coded. If a news report article was translated or used any of those seven Malay words (even if it was not a real protest activity) or any words in the pre-specified dictionary, it would be coded as a protest event. Thus, it was possible that automatic coding was more likely to extract inaccurate information by gathering other news events in rural areas and treating them as protest events.

As the police report database had better control over its content and completeness, this was used as the ground truth (the main reference) for this study. If different results between the databases occurred, that was a potential

[45] Refer Appendix A

problem for those datasets. At the same time, the alternative databases were utilised to ensure robustness.

Control Variables

The year and district fixed effects, as well as the night-light emission data, were used as control variables. The district fixed effects accounted for all the time-invariant factors that differed across the districts, such as geographic features or local culture. Year fixed effects were included to account for temporal trends across the districts. Including both district and year fixed effects reduced the list of potential confounders to those varying across both district and time. One such potential confounder was local economic development. To control for a district's economic development, data on nightlight emissions was used.[46] Nightlight emission data has recently been shown to be a good predictor of local economic wealth (Weidmann & Schutte, 2017).

Nightlight data contains information on the amount of light radiation from a particular location on earth. This information represents the wealth of that particular area. Satellites capture the light emissions, which are stored as high-resolution data.[47] Nightlight data is provided by the Defense Meteorological Satellite Program.[48] Data values range from 0-63, where 63 means fully lit and 0 means absolute darkness. The data was available annually from 2006 to 2013, and extrapolated district-specific trends were created for 2014 and 2015 to complete the ten-year panel.

[46] Nightlight emission has no information on a district in East Malaysia, Labuan. I treated this area in analysis as missing value. As the area is relatively small it does not give much effect on statistical analysis.

[47] The procedure and guideline of using the night light data was clearly explain by Lowe (2013), in his paper Night Light and ArcGis: A Brief Guide.

[48] Night time light are collected by the Defense Meteorological Satellite Program's Operational Linescan System (DMS-OLS) and images can be downloaded at https://www.ncdc.noaa.gov/

3.5 Empirical Strategy

Following Christensen and Garfias (2018) and Pierskalla and Hollenbach (2013), linear probability model estimates were used, which allowed the inclusion of year fixed effects to control the unobserved characteristics of the time/year differences. Protest occurrence was measured in two ways: first, as the logged number of protests in a district in a certain year and second, via a dichotomous indicator that took the value "1" if at least one protest occurred in a district and year and the value of "0" otherwise. The logged number captured the amount/probability of protests. For instance, the ICT might create the amount of protest but not the protest likelihood or the protest onset, which was captured by a binary measure (0/1). ICT may be relevant for the intensity of movement within an area, but may not create the protest onset. These two different measures captured two different concepts. Following Christensen and Garfias (2018), the general model for estimating the effect of coverage on protest was as follows:

$$Y_{it} = \alpha_i + \beta_t + \gamma C_{it} + \delta X_{it-1} + \varepsilon_{it}, \quad (1)$$

where y_{it} stands for either the logged number or the dichotomous measure of protest in a district i in year t. Meanwhile, α_i and β_t represent the district and year fixed effects, respectively. C_{it} captures the cellphone coverage (GSM, 3G, or both) in district i at year t, with a coefficient value notation of γ. X_{it} stands for the only control variable, with the coefficient value notation of δ as a district's average annual nightlight emission value. Internet expansion tends to be highly driven by the economic benefits, as supported in previous studies stating that internet accessibility is perhaps most strongly influenced by economic capabilities (Deloitte, 2012; Hennig-Thurau et al., 2004). To distinguish this potential effect, the nightlight emission values were lagged by one year and denoted as $_{-1}$, to increase the robustness of the estimate, while ε_{it} is the error term of the model. The scale of measurement for the key predictor variable ran from no internet connection (0) to fully internet-connected (1). This specification allowed the researcher to identify the average effects on protest onset of a change in coverage across all the districts between 2007 and 2016.

If Hypothesis 1 is correct, then a positive and statistically significant γ coefficient would be observed, indicating that the likelihood of protest increases as coverage in a district increases for both technologies. If Hypothesis 3 is correct, then it was expected that the γ coefficient for 3G coverage would be significantly larger than the γ coefficient for GSM.

For the second prediction, the change of coverage mediated by the current country-level network size would underwrite the protest occurrence. Thus, the equation used to test this proposition was as follows:

$$Y_{it} = \alpha_i + \beta_t + \gamma C_{it} + \zeta m_{ct} + \eta(C_{it} * m_{ct}) + \delta X_{it} + \varepsilon_{it}, \quad (2)$$

The only difference to Equation 1 is the inclusion of the term m_{ct}, which represents the total proportion of people in Malaysia with access to GSM/3G networks at time *t* in district *i*. $(C_{it} * m_{ct})$ represents the interaction effects captured through GSM/3G cellphone coverage and the total proportion of people in Malaysia with access to the GSM/3G networks at time *t* in district *i*. Meanwhile, in this observation, a greater probability of protest was expected when a higher proportion of people in a district could access the communication network.

3.6 Results

The following tables contain the regression results from the six models constructed to explore the variance in different conditions. The analysis was undertaken on 144 districts across Malaysia over a 10-year period.[49] Apart from the police report database, the results from the MMA and GEDELT databases were also compared to evaluate all the estimation equations.[50] The results from the police report database are reported as the main results, but all three databases are compared in the following charts.

[49] From the population data the district of Labuan (one small district in east of Malaysia) was unfilled. It has been treated as missing value in analysis.

[50] See Appendix 'A' for detail result of MMA and GEDELT database.

Table 3-3 presents the regression results based on Equation 1, while Table 3-4 presents the results based on Equation 2. The analysis results obtained were estimated using linear probability models via OLS. This approach was preferred as it allowed the inclusion of year fixed effects, while the same time-dependent variables are continuous and in binary. Panel A shows the results for the logged measure and Panel B shows the results for the dichotomous measure. Models 1 and 2 show the GSM coverage population; Models 3 and 4 show the 3G coverage population; Models 5 and 6 are the combined results of both technologies. For Models 2, 4, and 6, year fixed effects were included.

Table 3-3: Basic Model

	(1)	(2)	(3)	(4)	(5)	(6)
	GSM		3G		Combine	
Panel A: Number of Protests (logged)						
GSM	-0.056	-0.111			-0.056	-0.082
	(0.062)	(0.080)			(0.065)	(0.076)
3G			-0.006	-0.069*	1.942e-4	-0.062*
			(0.018)	(0.037)	(0.018)	(0.036)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.656	0.658	0.655	0.658	0.656	0.659
Observation	1440	1440	1440	1440	1440	1440
Panel B: Protest Occurrence (0/1)						
GSM	-0.055	-0.075			-0.059	-0.059
	(0.059)	(0.075)			(0.061)	(0.072)
3G			-0.003	-0.041	0.003	-0.036
			(0.014)	(0.028)	(0.014)	(0.026)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.638	0.640	0.638	0.640	0.638	0.640
Observation	1440	1440	1440	1440	1440	1440

Notes: The table reports the regression coefficient results. Linear Probability Model was performed via ordinary least squares (OLS). The measurement unit for outcome variables are in continuous and binary. The log measures the expected number of protest and dichotomous explain on the expected probability of the protest. The measurement scale for the key predictor is 0(no coverage), 1(100% coverage). Standard error in parentheses. p>0.1*, p>0.05**, p>0.01***. For some small results, scientific exponential notation was used to display the results by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n* th power.

Table 3-3 presents the results for the log-level and dichotomous regressions. The table also presents the results for both coverage technologies, GSM and 3G. For the GSM technology, the specifications and measures of the

outcomes in both panels indicate that the main coefficient estimate was negative. Examining Models 1 and 2, most approximated effects did not reach statistical significance. For the 3G technology, Panel A suggests that an increase of 3G technology by one unit (from no coverage to 100% coverage) would cause the expected number of protests to decrease by 6.9% and 6.2%. In Panel B, none of the regressors reached statistical significance.

The results appear to suggest that the spread of GSM and 3G technologies in Malaysia from 2007 until 2016 had no substantively meaningful impact on protest onset. When including both regressors in the model at the same time together with year fixed effects, only 3G technology reached negative statistical significance in the logged model, but the coefficient estimate was no longer statistically significant in the binary model.

Generally, the sign of the relevant coefficients in both panels was largely identical, indicating that the way outcomes are measured does not matter. It was expected that the increase in network coverage would have a positive effect on protest occurrence and that if a greater number of people had access to mobile technology, this would also increase the number of protests. Consequently, the results from Table 3-3 do not support hypotheses 1 and 3.

Table 3-4 presents the results of the interaction model outlined in Equation 2. The coefficients of the interaction term for Equation 2 were used to test hypothesis 2, which states that the greater the number of people with access to mobile communication technology, the greater the positive relationship between mobile communication technology and protest onset. The main point was to measure the effect on the direct proportion of the population with network coverage. From the theory, it was predicted that this relationship ought to be positive and statistically significant.

From the results, in both panels, there were successive increases in the proportion of people with access to communication technology, whilst the coefficient estimates of the proportion of people with GSM and 3G coverage shows inconsistency sign effect. Most resulting values, especially for the 3G interaction term has achieved statistically significant level at p value 0.1 and 0.05, however

the result are too tiny. There was lack of convincing evidence to reject the null hypothesis. This indicates that the expansion size and type of network had no substantial effect on protest onset, hence, hypothesis 2 was not supported.

Table 3-4: Interaction Effects

	(1)	(2)	(3)	(4)	(5)	(6)
	GSM		3G		Combine	
Panel A: Number of Protest (logged)						
Proportion Peps with GSM	0.105 (0.116)	0.055 (0.133)			0.154 (0.119)	0.132 (0.125)
Proportion Peps with 3G			-0.109 (0.052)	-0.117 (0.058)	-0.096* (0.053)	-0.101* (0.057)
Population GSM	0.582 (0.384)	1.697** (0.806)			0.504 (0.372)	0.507 (0.335)
Population 3G			0.075 (0.053)	0.091 (0.056)	0.041 (0.050)	0.065 (0.059)
GSM x Pop GSM	-1.79e-06 (1.72e-06)	-1.69e-06 (1.74e-06)			-2.16e-06 (1.68e-06)	-2.10e-06 (1.69e-06)
3G x Pop 3G			6.66e-07* (3.64e-07)	6.74e-07* (3.70e-07)	7.38e-07 (3.64e-07)	7.42e-07 (3.68e-07)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.658	0.660	0.665	0.666	0.668	0.669
Observation	1440	1440	1440	1440	1440	1440
Panel B: Protest Occurrence (0/1)						
Proportion Peps with GSM	0.145 (0.112)	0.126 (0.109)			0.172 (0.116)	0.172 (0.113)
Proportion Peps with 3G			-0.067* (0.036)	-0.068* (0.038)	-0.053 (0.034)	-0.054 (0.035)
Population GSM	0.424 (0.390)	1.101* (0.618)			0.377 (0.380)	0.481 (0.373)
Population 3G			0.056 (0.043)	0.044 (0.039)	0.021 (0.036)	0.017 (0.037)
GSM x Pop GSM	-2.09e-06 (1.69e-06)	-2.05e-06 (1.69e-06)			-2.34e-06 (1.69e-06)	-2.34e-06 (1.69e-06)
3G x Pop 3G			3.89e-07* (2.25e-07)	3.93e-07* (2.25e-07)	4.70e-07** (2.35e-07)	4.70e-07** (2.34e-07)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.644	0.645	0.643	0.644	0.651	0.651
Observation	1440	1440	1440	1440	1440	1440

Notes: The table reports the regression coefficient results. Linear Probability Model was performed via ordinary least squares (OLS). The measurement unit for outcome variables are in continuous and binary. The log measures the expected number of protest and dichotomous explain on the expected probability of the protest. The measurement scale for the key predictor is 0(no coverage), 1(100% coverage). Standard error in parentheses. p>0.1*, p>0.05**, p>0.01***. For some small results, scientific exponential notation was used to display the results by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n* th power.

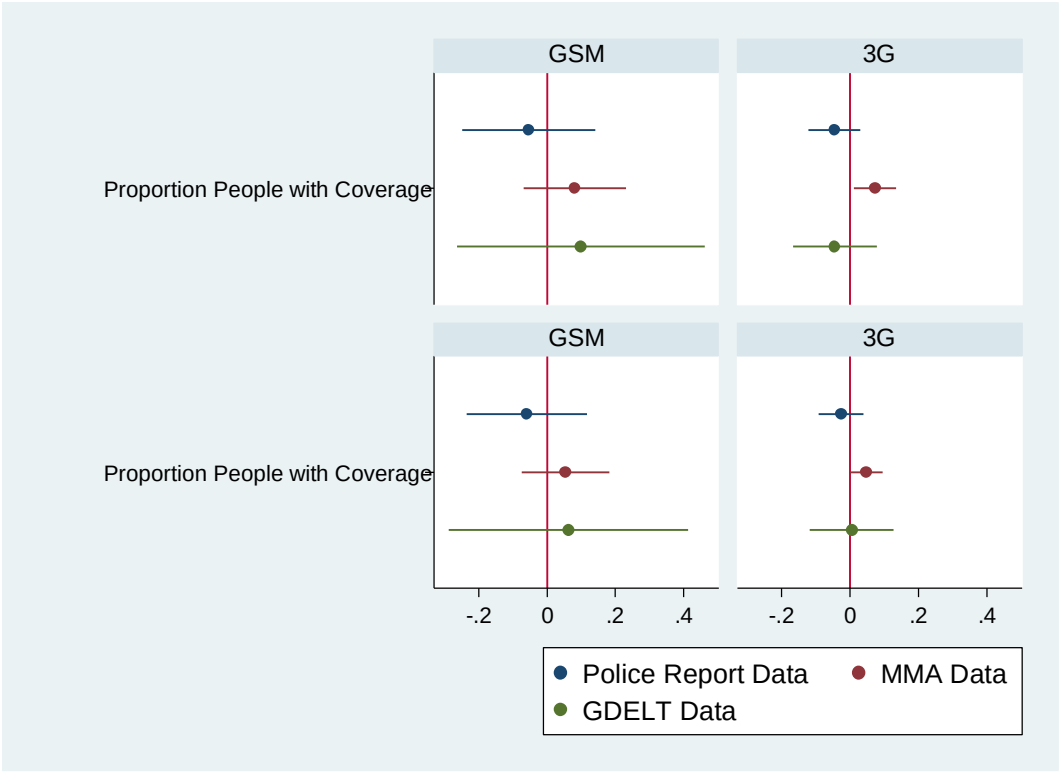
The analysis was extended using the MMA and GDELT databases. Since each data used a different year interval, all the databases were set at an equivalent year interval from 2007 to 2012,[51] as shown in Table 3-5.

Table 3-5: Protest Count from Three Different Databases

Database	*Protest count 2007-2012.*
Police Report	106
MMA Database	97
GDELT Database	1100

Notes: Each database recorded different figure in the different time intervals. These three databases were set to the same time interval of 2007 to 2012.

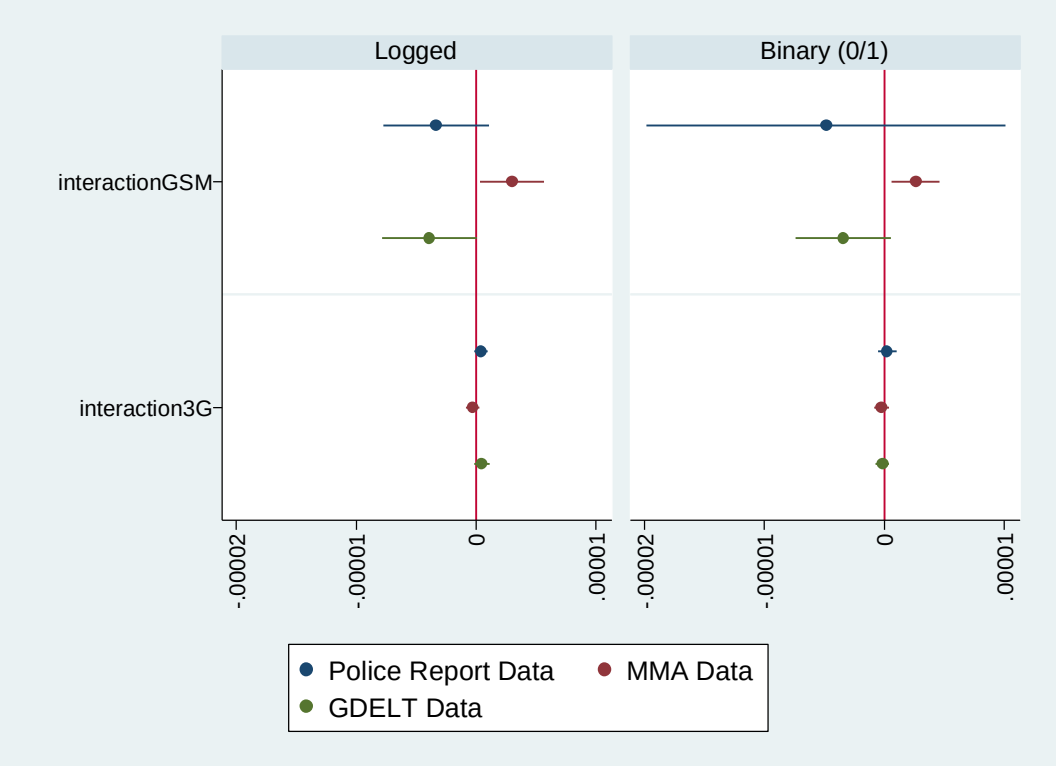
Figure 3-3: Results from Different Databases – Basic Model



Notes: The figure shows a combined plot of two networks, GSM and 3G, in logged and dichotomous measures and based on three different datasets. The plots display the point estimates and their confidence interval. The vertical red line is a reference line at zero.

[51] In order to compare these three databases, I have set the most suitable year for all databases is from 2007 to 2012.

Figure 3-4: Results from Different Database- Interaction



Notes: The figure shows the combined plot of two networks, GSM and 3G, in logged and dichotomous measures based on three different datasets. The plots display the point estimates and their confidence intervals. The vertical red line is a reference line at zero.

The results shown in Figures 3-3 and 3-4 were simplified. These figures show the point estimate results of the different protest databases for two different networks using year fixed effects. In both figures, the results refer to the combined model of regression. The full results for these three databases from 2007 to 2012 in yearly intervals can be found in Appendix C.

The databases were analysed using the same method. Figure 3-3 describes the results for the basic model (using Equation 1) from three different databases;[52] Figure 3-4 presents the interaction model (using Equation 2).

As shown in Figures 3-3 and 3-4, the databases appear to differ in terms of the overall results, but little difference is apparent in the interaction model for the 3G network. In the basic model, the GDELT database shows a positive and significant result for the 3G regressor, but the effect disappears when combined

[52] Detail result for all database (year interval 2007-2012), see 'Appendix C'

with year fixed effects. The result from the MMA database shows a stronger effect of 3G, with a positive and significant effect with and without year fixed effects in the 3G and combined models. However, in the interaction model, it displayed inconsistent results. For the police report database, no significant result was identified in the basic model. For interaction model, the regressor for proportion of people with GSM reach positif and significant in the logged model but the coefficient estimate was no longer significant in binary model. Overall, a comparison of these three databases revealed inconsistency and conflicting results, thus failing to reject the null hypothesis. There is a lack of convincing evidence that coverage expansion development has influenced protest activity in Malaysia.

3.7 Conclusion and Discussion

The results of this study indicate a lack of evidence that ICT exposure affects protest onset, particularly in Malaysia from 2007 to 2016. The results also suggest that neither GSM nor 3G technology provided convincing evidence to prove they had any significant effects on protest onset. The results somewhat contradict the study findings of Pierskalla and Hollenbach (2013) as well as Christensen and Garfias (2018), who used GSM technology as the main predictor variable.

Specific data and a specific country were used. These two measures could have contributed to the technical reasons for the findings. The analysis was derived from fine-grained information and specifically recorded protest events. Furthermore, Malaysia was a highly specific country sample, not a global sample across all continents or various types of governments.

As the focus of the analysis is the protest occurrence variable, it was clear that the results from the media source databases somewhat contradicted those of the police report database. One potential reason is that the media database produced a higher percentage of recorded protest occurrences in rural areas, which may have contributed to the contrary result. The study was not very

successful in showing the differences in quality between the databases due to the limited use of variables. The protest counts variable used in the analysis was unable to reveal the quality of the police report database in terms of its content and accurate source reporting, which addressed most of the shortcomings of the media reports. In future research, it is suggested that other variables are used to compare the quality of the databases (for example, the number of participants and the number of injuries).

Second, technological development may have had less impact in Malaysia. Based on the data, almost all the protests occurred in cities or highly populated places with coverage. Network providers usually focus on expanding the coverage in a highly-populated area or city due to the high demand. This should impact positively on protest as coverage helps to reduce the cost of coordinating a social movement. Across time, technological expansion moved towards rural areas but did not lead to protest coordination there. In this study, the examination of 3G technology found no convincing proof. Social movements still prefer to coordinate protests in cities but as the information reaches rural areas, the protest may expand in volume. Measuring the impact of technological development on protest occurrence is challenging. However, based on this study, one suggestion for the future researcher is to examine the volume variable. The variations of protest participation and internet progression may provide a new dimension through which to understand the impact of ICT on protest. Another potential reason that contributed to this result is that technology and protest occurrence have dynamic properties. This was one of the major challenges in this study as the effects might vary over time. The effect might be positive early on but move towards zero and negative. From the results, it was assumed that once the country had addressed the hurdle of the initial provision of technology, expanding the technology did not lead to more protests. Only the initial expansion of technology led to more protests. In other words, even with the expansion and upgrading of 3G technology in some areas, the general effect of technology on protest in Malaysia had already passed the initial provision. The initial stage of technological development that might have impacted protest was already over in the case of Malaysia. The data started to be obtained in 2007, whereas technological expansion in Malaysia has

continued since 1996.[53] This could mean the technology- and communication-related effects on protest happened in the years before this study period. Most places where people lived had telecommunications coverage (at least with GSM). For the years studied, internet expansions happened mostly in rural and new development areas that were far from the cities. These new expansion areas had no impact on protest as they were not strategic places to organise one.

Prior work by Pierskalla and Hollenbach (2013), as well as Christensen and Garfias (2018), found a positive association between extra-institutional activities and communication technologies. However, their studies examined different sets of times. Their results might have been driven by the African countries' cell phone connectivity, which may have just occurred/developed during their study period. Therefore, the effects might be overwhelming compared to those in Malaysia and other developing countries that had long been enjoying cell phone coverage.

The results potentially generated the second part of the protest trends, whereas Pierskalla and Hollenbach (2013), as well as Christensen and Garfias (2018), captured the first part of the process as all the countries in their studies started from the lower level of initial network coverage in 2007.

Overall, these results indicate that the effect of communication development on extra-institutional activity has still not provided a clear answer. Further research is needed, particularly on a specific country or different context by using high-quality data. Future researchers are highly recommended to study less-developed countries in South East Asia that may still be in the initial phase of ICT development.

[53] Under Malaysia 7th Plan in 1996, a 'cyber-region' known as the Multimedia Super Corridor (MSC) project was launched, covering area form the south of Kuala Lumpur. Designed as a global centre for multimedia technologies and contents, its aim was to 'leapfrog' Malaysia from the Industrial Era to the Information Era. The MSC was in line with Prime Minister Mahathir's Vision 2020, the dream of a fully developed, knowledge-driven Malaysia by 2020 (Brown, 2005; Postill, 2014).

3.8 Appendix

A: Protest Keywords

Table 3-6: Protest Keywords

Alternative keywords for protest in Malay	*Protes* *Piket* *Demo* *Demonstrasi* *Tunjuk perasaan* *Mogok* *Bantahan*

Notes: Seven different words in Malay are usually used to represent the term 'protest' (one should refer to the whole sentence). Some of these words may not directly mean protest if they are individually translated into English. Two Malay words can be directly translated into the word 'protest' in English, '*bantahan'* and *'membantah';* however, these two words do not always mean 'protest' in a Malay sentence. In Malay, it is necessary to refer to the whole sentence to obtain the best meaning, not rely on a specific word within the sentence.

B: Coding Procedure

Due to the extensive information in the police report database, a detailed approach was taken to extract high-quality information. The following steps were taken in the coding procedure.

Step 1- Obtain the data

The raw data was downloaded from the police database, which contained all the report information and categories.

Step 2- Combine the data

All the 10 years' worth of data was combined into one single file according to its state of origin.

Step 3- Search the data

Using the "find" tool in Microsoft Word, all seven keywords were searched for one by one.

Step 4- Identify the information

From the highlighted words, each report was carefully read from the beginning and the keywords were coded into the spreadsheet.

Step 5- Code the information into a spreadsheet

Each column in the spreadsheet contains specific variables. The information was then copied from the raw police reports into the correct spreadsheet column, according to the variables.

Step 6- Repeat the process

The same process was repeated for all the states.

Steps 7- Check the Validity

After the coding was complete, the spreadsheet was examined to validate all the information. The content was checked and the variables assigned to ensure they were all correctly coded.

C: Results from Police Report, GDELT and MMA databases for 2007-2012

Police Report Database (2007-2012)

Table 3-7: Basic Model (Police Report)

	(1)	(2)	(3)	(4)	(5)	(6)
	GSM		3G		Combine	
Panel A: Number of Protests (logged)						
GSM	-0.052	-0.053			-0.047	-0.035
	(0.081)	(0.098)			(0.083)	(0.095)
3G			-0.008	-0.046	-0.005	-0.044
			(0.021)	(0.038)	(0.022)	(0.037)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.628	0.630	0.628	0.631	0.628	0.631
Observation	864	864	864	864	864	864
Panel B: Protest Occurrence (0/1)						
GSM	-0.055	-0.060			-0.060	-0.050
	(0.072)	(0.089)			(0.071)	(0.084)
3G			5.612e-4	-0.026	0.005	-0.024
			(0.017)	(0.032)	(0.016)	(0.031)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.573	0.576	0.573	0.576	0.573	0.576
Observation	864	864	864	864	864	864

Notes: The table reports the regression coefficient results. Linear Probability Model was performed via ordinary least squares (OLS). The measurement unit for outcome variables are in continuous and binary. The log measures the expected number of protest and dichotomous explain on the expected probability of the protest. The measurement scale for the key predictor is 0(no coverage), 1(100% coverage). Standard error in parentheses. p>0.1*, p>0.05**, p>0.01***. For some small results, scientific exponential notation was used to display the results by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n* th power.

Table 3-8: Interaction Effect for Logged and Binary (Police Report)

	(1)	(2)	(3)	(4)	(5)	(6)
	GSM		3G		Combine	
Panel A: Number of Protest (logged)						
Proportion	0.321*	0.312*			0.288*	0.301*
Peps with GSM	(0.179)	(0.178)			(0.172)	(0.172)
Proportion			-0.081	-0.080	-0.052	-0.051
Peps with 3G			(0.051)	(0.054)	(0.048)	(0.049)
Population	0.894	-1.460			0.494	1.130
GSM	(1.061)	(4.664)			(1.136)	(3.506)
Population			0.050	0.041	0.023	0.010
3G			(0.052)	(0.067)	(0.048)	(0.085)
GSM x Pop	-3.62e-06	-3.53e-06			-3.40e-06	-3.35e-06
GSM	(2.34e-06)	(2.33e-06)			(2.23e-06)	(2.22e-06)
3G x Pop 3G			4.50e-07	4.38e-07	4.34e-07	4.22e-07
			(2.78e-07)	(2.83e-07)	(2.85e-07)	(2.84e-07)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.636	0.638	0.634	0.636	0.641	0.642
Observation	864	864	864	864	864	864
Panel B: Protest Occurrence (0/1)						
Proportion	0.276	0.276			0.248	0.270
Peps with GSM	(0.175)	(0.174)			(0.171)	(0.172)
Proportion			-0.055	-0.054	-0.028	-0.025
Peps with 3G			(0.046)	(0.048)	(0.045)	(0.046)
Population	0.519	-0.799			0.264	-0.830
GSM	(0.883)	(3.997)			(1.040)	(2.749)
Population			0.035	0.014	0.010	-0.037
3G			(0.044)	(0.061)	(0.043)	(0.078)
GSM x Pop	-3.26e-06	-3.24e-06			-3.15e-06	-3.18e-06
GSM	(2.29e-06)	(2.31e-06)			(2.25e-06)	(2.27e-06)
3G x Pop 3G			3.58e-07	3.52e-07	3.45e-07	3.37e-07
			(2.74e-07)	(2.77e-07)	(2.83e-07)	(2.80e-07)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.583	0.586	0.579	0.581	0.589	0.590
Observation	864	864	864	864	864	864

Notes: The table reports the regression coefficient results. Linear Probability Model was performed via ordinary least squares (OLS). The measurement unit for outcome variables are in continuous and binary. The log measures the expected number of protest and dichotomous explain on the expected probability of the protest. The measurement scale for the key predictor is 0(no coverage), 1(100% coverage). Standard error in parentheses. p>0.1*, p>0.05**, p>0.01***. For some small results, scientific exponential notation was used to display the results by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n* th power.

GDELT Database (2007-2012)

Table 3-9: Basic Model (GDELT)

	(1)	(2)	(3)	(4)	(5)	(6)
	GSM		3G		Combine	
Panel A: Number of Protests (logged)						
GSM	0.327*	0.098			0.248	0.118
	(0.175)	(0.183)			(0.176)	(0.184)
3G			0.100**	-0.044	0.082*	-0.050
			(0.045)	(0.061)	(0.046)	(0.061)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.770	0.779	0.771	0.779	0.771	0.779
Observation	864	864	864	864	864	864
Panel B: Protest Occurrence (0/1)						
GSM	0.294	0.062			0.203	0.061
	(0.176)	(0.177)			(0.177)	(0.178)
3G			0.110**	0.004	0.095*	0.001
			(0.047)	(0.061)	(0.048)	(0.062)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.449	0.463	0.451	0.463	0.452	0.463
Observation	864	864	864	864	864	864

Notes: The table reports the regression coefficient results. Linear Probability Model was performed via ordinary least squares (OLS). The measurement unit for outcome variables are in continuous and binary. The log measures the expected number of protest and dichotomous explain on the expected probability of the protest. The measurement scale for the key predictor is 0(no coverage), 1(100% coverage). Standard error in parentheses. p>0.1*, p>0.05**, p>0.01***. For some small results, scientific exponential notation was used to display the results by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n* th power.

Table 3-10: Interaction Effect for Logged and Binary (GDELT)

	(1)	(2)	(3)	(4)	(5)	(6)
	GSM		3G		Combine	
Panel A: Number of Protest (logged)						
Proportion Peps with GSM	0.715*** (0.267)	0.522** (0.260)			0.578** (0.256)	0.510** (0.262)
Proportion Peps with 3G			-0.057 (0.060)	-0.083 (0.064)	-0.049 (0.064)	-0.057 (0.066)
Population GSM	-0.189 (2.101)	-31.74*** (9.544)			-0.511 (2.147)	-1.991 (5.665)
Population 3G			0.296*** (0.099)	0.446*** (0.145)	0.258*** (0.099)	0.350* (0.188)
GSM x Pop GSM	-3.93e-6 (1.92e-6)	-4.08e-06** (1.91e-06)			-3.66e-06* (1.95e-06)	-3.88e-06** (2.00e-06)
3G x Pop 3G			4.12e-07 (3.25e-07)	4.96e-07 (3.25e-07)	4.18e-07 (3.12e-07)	4.78e-07 (3.14e-07)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.772	0.781	0.775	0.780	0.777	0.782
Observation	864	864	864	864	864	864
Panel B: Protest Occurrence (0/1)						
Proportion Peps with GSM	0.573*** (0.253)	0.398 (0.245)			0.475** (0.245)	0.406 (0.248)
Proportion Peps with 3G			0.044 (0.062)	0.016 (0.064)	0.050 (0.068)	0.041 (0.069)
Population GSM	-1.867 (2.284)	-29.73*** (9.052)			-1.490 (2.262)	-2.090 (6.504)
Population 3G			0.259*** (0.099)	0.416*** (0.137)	0.228** (0.101)	0.331* (0.190)
GSM x Pop GSM	-3.10e-06 (1.92e-06)	-3.24e-06* (1.90e-06)			-3.26e-06 (1.99e-06)	-3.43e-06* (2.01e-06)
3G x Pop 3G			-2.39e-07 (2.97e-07)	-1.53e-07 (2.97e-07)	-2.24e-07 (2.82e-07)	-1.69e-07 (2.87e-07)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.452	0.466	0.454	0.464	0.458	0.466
Observation	864	864	864	864	864	864

Notes: The table reports the regression coefficient results. Linear Probability Model was performed via ordinary least squares (OLS). The measurement unit for outcome variables are in continuous and binary. The log measures the expected number of protest and dichotomous explain on the expected probability of the protest. The measurement scale for the key predictor is 0(no coverage), 1(100% coverage). Standard error in parentheses. p>0.1*, p>0.05**, p>0.01***. For some small results, scientific exponential notation was used to display the results by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n* th power.

MMA Database (2007-2012)

Table 3-11: Basic Model (MMA)

	(1)	(2)	(3)	(4)	(5)	(6)
	GSM		3G		Combine	
Panel A: Number of Protests (logged)						
GSM	0.056	0.080			0.026	0.052
	(0.058)	(0.075)			(0.058)	(0.073)
3G			0.033***	0.072**	0.031***	0.069**
			(0.009)	(0.031)	(0.010)	(0.031)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.711	0.713	0.711	0.716	0.711	0.716
Observation	864	864	864	864	864	864
Panel B: Protest Occurrence (0/1)						
GSM	0.049	0.053			0.018	0.035
	(0.059)	(0.064)			(0.058)	(0.063)
3G			0.033***	0.047**	0.032***	0.045*
			(0.010)	(0.024)	(0.010)	(0.023)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.477	0.481	0.479	0.483	0.479	0.483
Observation	864	864	864	864	864	864

Notes: The table reports the regression coefficient results. Linear Probability Model was performed via ordinary least squares (OLS). The measurement unit for outcome variables are in continuous and binary. The log measures the expected number of protest and dichotomous explain on the expected probability of the protest. The measurement scale for the key predictor is 0(no coverage), 1(100% coverage). Standard error in parentheses. p>0.1*, p>0.05**, p>0.01***. For some small results, scientific exponential notation was used to display the results by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n* th power.

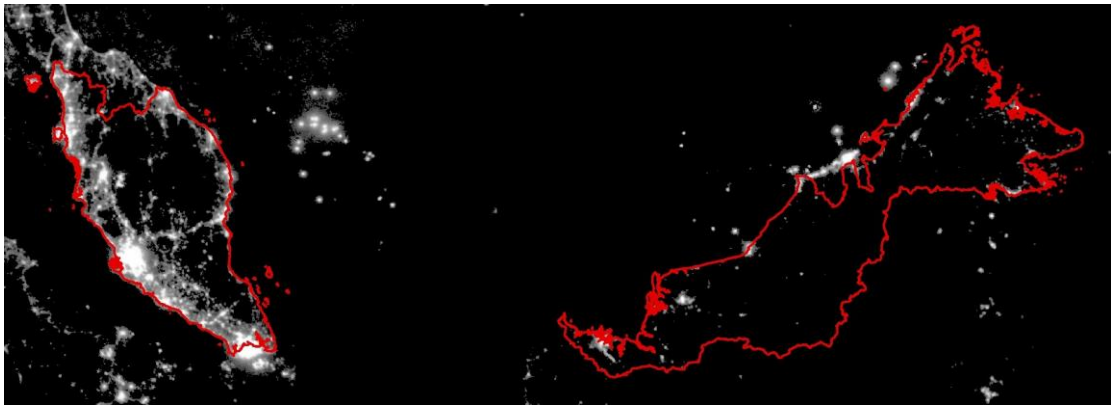
Table 3-12: Interaction Effect for Logged and Binary (MMA)

	(1)	(2)	(3)	(4)	(5)	(6)
	GSM		3G		Combine	
Panel A: Number of Protest (logged)						
Proportion	-0.274***	-0.262**			-0.258***	-0.248***
Peps with GSM	(0.103)	(0.100)			(0.105)	(0.105)
Proportion			0.088**	0.096***	0.067	0.069
Peps with 3G			(0.045)	(0.046)	(0.049)	(0.050)
Population	0.246	2.089			0.671	-1.001
GSM	(1.127)	(3.864)			(1.158)	(1.204)
Population			-0.053	-0.091	-0.030	-0.066
3G			(0.056)	(0.057)	(0.058)	(0.054)
GSM x Pop	3.37e-6***	3.30e-6***			3.06e-06***	2.99e-06***
GSM	(1.30e-6)	(1.31e-6)			(1.34e-06)	(1.35e-06)
3G x Pop 3G			-2.95e-07	-3.06e-07	-2.93e-07	-2.91e-07
			(2.69e-07)	(2.75e-07)	(2.77e-07)	(2.81e-07)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.719	0.721	0.715	0.718	0.722	0.724
Observation	864	864	864	864	864	864
Panel B: Protest Occurrence (0/1)						
Proportion	-0.230***	-0.236***			-0.235***	-0.227***
Peps with GSM	(0.078)	(0.080)			(0.081)	(0.083)
Proportion			0.060	0.067	0.042	0.043
Peps with 3G			(0.040)	(0.042)	(0.046)	(0.047)
Population	0.355	-1.227			0.654	-1.104
GSM	(1.088)	(3.294)			(1.153)	(1.594)
Population			0.010	-0.024	0.030	-0.004
3G			(0.038)	(0.042)	(0.041)	(0.044)
GSM x Pop	2.86e-6***	2.79e-6***			2.69e-06***	2.61e-06***
GSM	(9.53e-7)	(9.52e-7)			(1.02e-06)	(1.02e-06)
3G x Pop 3G			-2.45e-07	-2.54e-07	-2.44e-07	-2.41e-07
			(2.99e-07)	(3.05e-07)	(3.09e-07)	(3.12e-07)
Year FE	No	Yes	No	Yes	No	Yes
R^2	0.488	0.490	0.481	0.486	0.491	0.493
Observation	864	864	864	864	864	864

Notes: The table reports the regression coefficient results. Linear Probability Model was performed via ordinary least squares (OLS). The measurement unit for outcome variables are in continuous and binary. The log measures the expected number of protest and dichotomous explain on the expected probability of the protest. The measurement scale for the key predictor is 0(no coverage), 1(100% coverage). Standard error in parentheses. p>0.1*, p>0.05**, p>0.01***. For some small results, scientific exponential notation was used to display the results by replacing part of the number with E+*n*. E (exponent) multiplies the preceding number by 10 to the *n* th power.

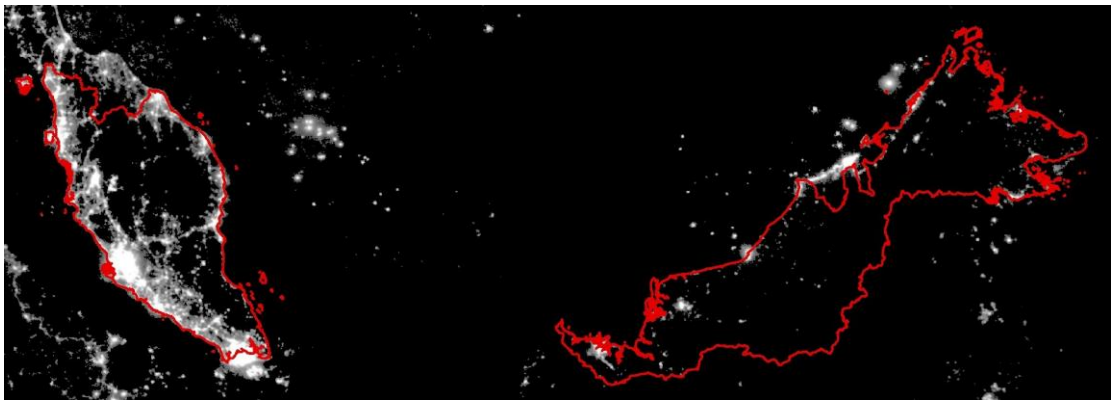
D: Maps

Figure 3-5: Malaysia Night Light Emissions 2007



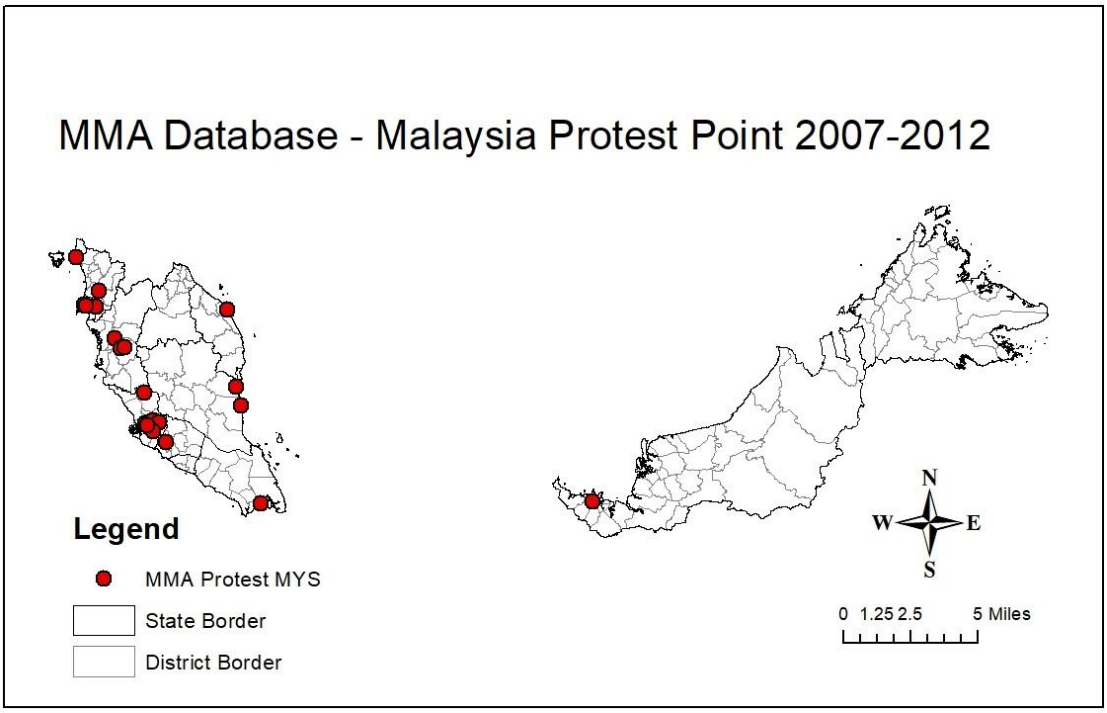
Notes: The light emissions (brightness) graphic shows higher concentrations in urban areas and Peninsula Malaysia.

Figure 3-6: Malaysia Night Light Emission 2012



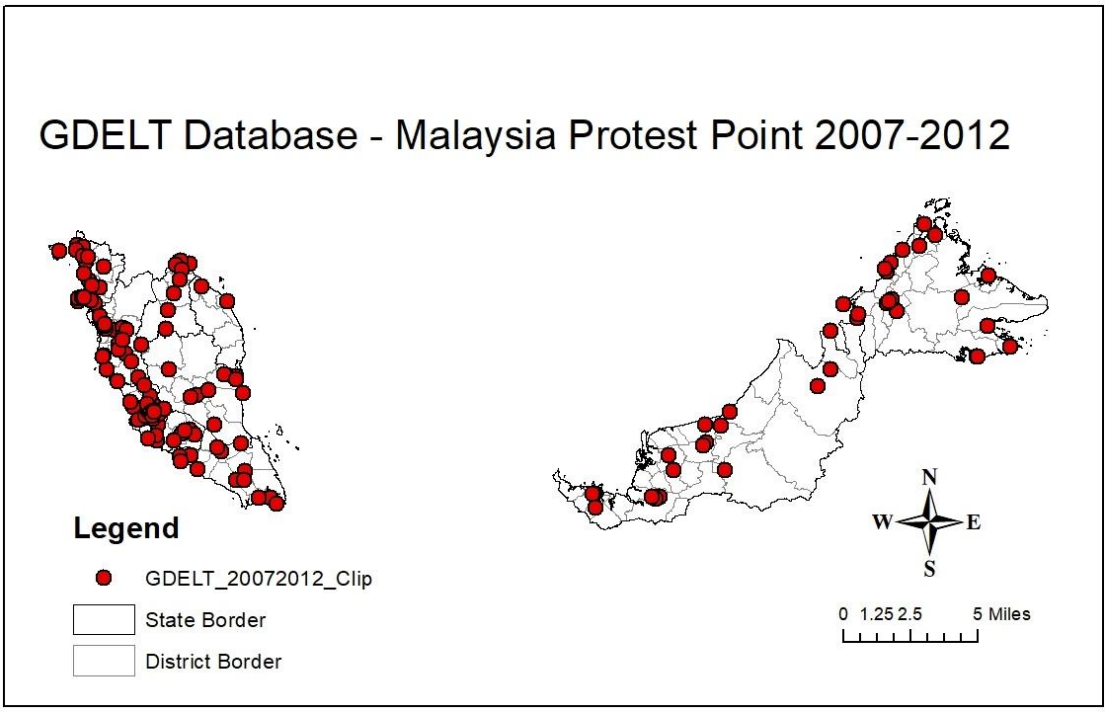
Notes: The light emissions (brightness) spread outside/around the urban areas and Peninsular Malaysia.

Figure 3-7: MMA Protest Points



Notes: The red dots indicate the protest locations recorded in the MMA Database from 2007 to 2012.

Figure 3-8: GDELT Protest Points



Notes: The red dots indicate the protest locations recorded in the GDELT Database from 2007 to 2012.

Chapter 4

DOES ICT ENABLE COLLECTIVE ACTION COORDINATION? EVIDENCE FROM A SURVEY EXPERIMENT IN RURAL MALAYSIA

4.1 Introduction

The previous chapter discussed what the internet offers to the recent communication advancements and then argued that information communication technology efficiently assists and promotes protest onset. However, the analysis indicated that no statistically significant relationship could be found between information communication technology and protest onset. This finding probably gives only a partial picture. The analysis so far has only examined whether the development of information communication technology has had an impact on overall protest occurrence in Malaysia. Therefore, this section delves deeper into the mechanism behind the protest, leading to the main question: what role does the internet play in coordinating and mobilising protest onset?

Current popular discourse suggests that ICT plays an important role in modern political unrest. Some scholars seem to believe that the Internet plays a major role in coordinating protests, for instance, during the political upheavals in Tunisia, Egypt, Syria, Turkey, and some other countries (Breuer et al., 2015; Gohdes, 2015; Kahn & Kellner, 2004; Van Laer, 2007). Recent works have also examined how the internet shapes public behaviour. Via social media, the internet has been significantly associated with protest activities (Lee, 2009; Valenzuela, Arriagada, & Scherman, 2012; Valenzuela, Arriagada, & Scherman, 2014), but it has also been argued that the role of ICT is often misinterpreted as the cause rather than the result of discontent with a regime (Shirky, 2011).

It is important to understand the role played by ICT in the democratic environment, which has implications for public life. Some studies have highlighted this question (Chen et al., 2014; Hettiarachchi, 2007; Huang & Science, 2009; Miner, 2012); however, the theoretical mechanism of these two elements remains very difficult to define.

In Kashmir, the Indian-controlled authorities shut down internet services at the height of the contention between Pakistan and India, part of their ongoing struggle for the territory of Kashmir. The internet blackout lasted more than 135 days, the longest ever internet blackout for a democracy (Griffiths, 2019). Other countries have embraced the same tactic, such as Egypt, Libya, Syria, Zimbabwe, the Democratic Republic of Congo, Chad, and Ethiopia, which involves cutting off internet access in an attempt to prevent further escalations of anti-government protests. In these scenarios, the general assumption behind this action was that the internet caused the protest; instead, it was specifically the online communication platforms that facilitated participation in and the onset of the protests.

This indicates that communication is vital in coordinating social movements; however, the role of communication is not a popular subject among social movement researchers. There are several likely reasons why communication functions are regarded as having been abandoned in social movements. Firstly, social movement studies have mainly considered the operationalisation of democracy (e.g., electoral accountability, democratic characteristics, and development) while setting the function of communication as separate (della Porta, 2011). Second, studies on the mobilisation and coordination of protests have not examined their mechanisms in depth. Much existing literature has not clearly unpacked how exactly communication development matters to protest onset. Furthermore, the existing literature is more likely to focus on overcoming collective action problems (Centola, 2013; Pierskalla & Hollenbach, 2013; Shadmehr & Bernhardt, 2011). However, in the framework of collective action devised by Olson (1971), communication has no clear role. One model that posits a more concrete role for communication is the coordination model of Schelling (1978, 1980), whereby protest was seen to trigger subsequent

participation by influencing individuals through the messages or information transferred. In this model, communication plays a key role in coordination but it remains unclear how it matters and why ICT should matter more than the traditional form of communication. Hence, the current study uses the coordination game approach to highlight how social media communication particularly enables coordination in higher-order beliefs and therefore increases the ability to coordinate the outcome (i.e., the protest).

This paper presents the findings from an original survey experiment designed to examine the coordination mechanism underlying the effects of technology on protest onset. The results were analysed from the coordination model perspective. The main factors in this model were (i) internet accessibility (that is, a population with an internet connection and a population without), (ii) the type of message stimulus (for instance, conventional media messages and social media messages with a popularity indicator). The researcher studied the interaction of the public with the message outlet to obtain the protest information for the coordination model. This was suitable because social media not only provides protest messages but also indicates what others do and believe.

To determine the effect of ICT on protest onset, it was useful to undertake a comparative study between populations with and without internet access. For that purpose, six very similar rural villages in Kedah (a state in northern Malaysia) were selected, of which three were about or waiting to obtain 3G coverage[54] but the other three were not. Approximately two weeks before the tower went on-air, the first-round survey was administered with a total of 300 respondents from the six villages. In that survey, the researcher randomly assigned different show-cards (the stimulus) containing the same information about protests but using different layouts: (1) a newspaper cutting, (2) popular social media (a Facebook layout with high numbers of likes and shares), and (3) non-popular social media (a Facebook layout with low numbers of likes and shares). After three and a half months, a

[54] 3G networks is minimal network acquired to access any internet platform like social media and many more.

follow-up survey was conducted, in which the individuals were asked the same questions to observe the effect of the treatment.

This experiment produced a lack of evidence that ICT development affected the villagers in terms of protest onset. The investigation into the mechanism based on the theoretical argument continued by exploring the importance of the message. The result also revealed no clear evidence of a difference between the importance of social media messages and conventional media messages. Additionally, this demonstrates that in the social media context, a popular post is not seen as important. These results reflect those of Theocharis, Lowe, Deth, and García-Albacete (2015), who also found that ICT was not a predominant instrument in support of protest participation.

The current study contributes to a growing body of literature on the effect of ICT on political protest and relates most directly to the literature that explores the complex relationship between the new media, government, and social movements. More specifically, performing a field experiment revealed the effect of coordination mechanisms in a realistic setting. A field experiment has many advantages over previous research strategies. A naturalistic environment delivers the most natural response from the respondents. However, this study contained limitations. Although a high percentage of follow-up completion was obtained, the total number of observations (n=564) was relatively small. Furthermore, the experiment in this study was also limited to a short time interval.

The following section discusses the theoretical foundation for this study, as well as the real role of communication in protest mobilisation using the collective action and coordination theories. Then, the function of ICT is considered by emphasising its potential impact on the coordination of social movements.

4.2 From Collective Action to Coordination Model

The features of the new communication technology have allowed protest in general to reach a level that was previously impossible (Tufekci, 2017). Many studies argue that the key to the recent protests has been access to the new

information communications technology (Baron, 2013; Breuer et al., 2015; Clarke & Kocak, 2018; Epstein, 2011; Sebastián Valenzuela et al., 2012; Zhang et al., 2010). Nevertheless, many social movement and protest studies fundamentally draw on the perspective of collective action (Christensen & Garfias, 2018; Christiansen, 2009; Diani, 2011; Van Laer, 2007). Less is known about the way these circumstances can bring people together to protest. It is important to determine the right premise for studying the mechanism of the effect of ICT on protest onset.

This section highlights the difference between collective action and coordination problems and discuss which is more appropriate model to capture the features of protest reality. The section begins by reviewing the work of Mancur Olsen on collective action. Following that, the alternative setup is explained by presenting the coordination theory.

Collective Action Problem

There have been numerous debates on the collective action theory (Chen et al., 2014; Maiguashca, 2011; McCarthy & Zald, 1977; Tufekci & Wilson, 2012). Most political scientists have discussed this issue by examining the goal/s of a movement group and the cost of individual participation. In the collective action framework, the main points have been the likely cost of participating and the possible benefits or rewards gained from participation, all of which, crucially, are based on expectations of the actions of others.

Collective action also involves the provision of public goods. Public goods refers to products or services that are non-rivalrous and non-excludable. This means, for instance, that any consumer's consumption of such a product does not affect its availability to others. The consumption of public goods also does not cause any reduction in the quantity or quality of products or services; furthermore, no consumer is capable of excluding any person from consuming those goods (Samuelson, 1955). Common examples of public goods are roads, clean water, and even regime change (better governance). In protests, individuals who participate engage with certain costs and risks. The cost outlay is completely sourced from the individual, however, when the objective of the public good has

been achieved. The benefit from public goods can be enjoyed by all individuals, who equally enjoy the total value of the goods, including those who did not contribute to the process of obtaining the public goods in the first place. Ironically, if the protest was not a success, the protesters would be penalised by the authorities and/or other constraints would be encountered by the individual. It can be assumed that the individual's contributions are costly and high-stakes. The commitment to secure goods for the public requires costs and sacrifices of, for example, time, effort, and other resources (Opp, 2009).

Opp (2009) explained a macro proposition, suggesting group (a collection of individuals with a common goal) size as the unit of analysis, whereby the larger the group, the less public good is provided. This was because individuals would not be familiar with one another in a large group setting; hence, the larger the group, the less likely it is to overcome the free-rider problem, making its achievement of the public good less likely. Opp (2009) also detailed a micro proposition in which the rational element and self-interest of the individuals are engaged. Here, the individual does not contribute to achieving their goals unless faced with coercion or some other special device. Thus, to overcome the issue of individual self-interest, Olson proposed the idea of selective incentive, which refers to allotting additional benefits to those who contribute to the public good. It is implied that the stronger the positive selective incentive to contribute, the stronger the negative selective incentive not to contribute. Thus, it is more likely the individual will provide for the public good (Opp, 2009). When the group gets larger, the individual will become relatively less effective. An individual contribution to the outcome is less noticeable, which will encourage individuals to seek and gain benefits from other actors'/peoples' efforts. Free-riding is the issue that the rational actor must overcome to ensure all the individuals synergise together as a group to accomplish the public good (Olson, 1971).

As noted above, in contentious politics, Olson's (1965) work contributes to a major area of study exploring free-riding issues. Many scholars interpret Olson's argument by identifying a collective action problem in a prisoner's dilemma situation (Hardin, 1971; Schofield, 1975). To understand the collective action problem more clearly, the following situation could arise:

Imagine that two people are contemplating when to join a public protest. These individuals must choose one of two possible actions, join the protest or not join the protest by staying at home. Both players make their decisions simultaneously, so they do not know whether the other will join the protest or not. An example of a payoff structure for this game is described below:

Table 4-1: Collective Action Problem

		Person B	
		Protest	Stay at home
Person A	Protest	1, 1	-2, 2
	Stay at home	2, -2	0, 0

Notes: The payoff value on the left in each cell is paid to Person A, that on the right to Person B.

The values in the matrix above range from -2 to 2. Two is the favoured outcome and -2 is the worst possible outcome. The lower value means the maximum cost and the higher value means the greatest benefit. The cost here represents the risks that a player/person must take, such as getting beaten by the police during the protest or being caught or jailed; meanwhile, the benefit represents collective goods such as a change in the status quo. The matrix reflects the benefit of a change in the status quo, which can be brought about by one player's action and a cost term for protesting, which is higher if one protests alone. If both players protest, the benefit is greater than zero; if nobody protests, they both get a 0 payoff. If only one player protests, there is still a change in the status quo, while the one who did not protest will receive the benefit but the one who protested pays a cost that is smaller than zero.

Hence, there are four possible outcomes to this game. Each cell in the matrix represents a situation. To obtain the first outcome, both players go out to protest and both share the cost, denoted as 1, 1. In the second outcome, if only person A goes out to protest and person B stays at home, person A will bear all the hardship alone, denoted by -2, while person B (who stayed at home) will bear no cost, but they will enjoy the benefit if the protest succeeds, denoted by 2. The third outcome is the same as the second situation: if only person B goes out to protest and person A stays home, only the person who goes out will bear all the cost, denoted as-2, while the one who stays at home may benefit, denoted 2. The fourth outcome happens when both players do not go out to protest. As they do not go

out, neither bears any cost, but this lowers the chance of successfully achieving the collective good, which was denoted as 0, 0.

Consequently, from a social perspective, the ideal action for the player is to choose an option with minimal cost and maximum benefit (the other pays the cost, but the player still gets the maximum benefit). Actors never want to protest, independently of the other actor's actions, as they want to avoid being the one who produces a costly collective good (a change in the status quo) and prefer to free-ride on the efforts of the other player. For that reason, no matter what the other player does, a person will always choose to stay at home. When everybody does that, the outcome will always be that no protest occurs.

Although the scenario is fictional and abstract, it represents a real-world analogue. The collective good (e.g., a regime change) could be produced by a single actor, but this actor would then have to bear the full costs, while the other actor receives the full benefit baring none of the costs. If both actors protest the collective good is also produced, but the costs associated with its production are shared. Note that in this game communication between actors does not help them coordinate on a different outcome. Assuming individual rational actors, both A and B have a strictly dominant strategy: it is always better to stay at home than to protest, no matter what the other person does or says, so the collective good is never produced in equilibrium.

If only one player chooses to protest, the chance of success is very low, but if both protest, the chance of success is higher. In any case, independently of the other individual's action, a greater advantage is earned if the first individual stays at home. Regardless of the other person's action, the strategy is to earn a larger payoff than that of any other player. When person B bears all the risk by participating in the protest, and if the protest is successful, person A will also receive as much public benefit as person B. It is the same if only person A goes to the protest but person B does not.

Protesting is a costly action when an individual does it alone; he will only create a cost. People only participate if they know the outcome of success is higher

than the cost. Clearly, in this model, no communication exists, which subsequently influences the outcome: both prefer to free-ride on each other.

Understood from a collective action perspective, the best option for every player is to free-ride on the other players. With one equilibrium, this matrix is considerably stable and following a dominant strategy has a clear advantage. People prefer to benefit by not going to participate in a protest, gaining an advantage over those who actually do protest for the benefit. This scenario demonstrates the emergence of the free-rider problem, whereby a rational choice is the best option.

From this perspective, when the majority want a free ride all the time, it distorts the objective of the protest. Consequently, examining extra-institutional activities from the premise of collective action does not provide a proper understanding of the phenomenon because people's actions are entirely based on an independent decision. It is impossible to engage people's understanding when there is no scope for communication.

Various studies have scrutinised and revised Olson's theory in an attempt to resolve the problem associated with collective action. For instance, Frohlich and Oppenheimer (1978) posited the theory of political entrepreneurship as the main explanation for the success or failure of collective action. The result of collective action depends on the political entrepreneurship of the particular group. The desire of the individual to participate in collective action will rise in parallel with the resources and capital provided by the political entrepreneur, who leads the organisation. When resources and capital are provided or guaranteed by the political entrepreneur, this improves the chances of achieving collective action. Based on this scenario, Jenkins (1983) studied entrepreneurial mobilisation by political entrepreneurs, which he accessed using the collective action theory. He proposed that institutional resources were a critical element and emphasised the importance of the organisation, resources, and political opportunity. He concluded that the mobilisation model reflected the link between collective interest, the aggregation of benefit, and the consumption of various related resources during the process.

For this reason, Melucci's theory (1988) emphasised identity in the field of social movements and political protest. Identity is the main element of collective action as it creates motivation and enforces participation in the collective good. For example, green/environmental movements, anti-animal cruelty movements, and most (non-profitable) social movements are difficult for materialists to comprehend as they cannot be explained by material interests. Another argument was made by Tarrow (1994), who criticised the logic of the collective action theory as it was not based on tangible materialist factors. He also argued the Olson theory did not consider the political and social context. The theories seemed to lack relationships and connections between individuals, so Tarrow (1994) argued that social networks are an integral component of materialist collective action.

Overall, in the author's opinion, collective action is not an appropriate premise for understanding protest onset. It only highlights individual self-interest, which is based on the assumption of materialists. There is no scope to create a common understanding among the participants. In a high-risk activity like protest, it is inevitable that cooperation will be needed in the pursuit of a shared objective. The following section discusses the coordination theory.

Role of Communication in Coordination

In *The Strategy of Conflict*, Schelling (1960, 1980) demonstrated the scenario of a meeting place as an example of a coordination problem. The coordination problem involves a lack of common information. Everyone would benefit from possessing this information and coordination may be easier to achieve through this, but with only limited information, they may not know how to achieve their goals.

To further explain the difference between collective action and the coordination problem, Edna Ullmann-Margalit (1977, p.129-130) illustrated two cases. The first was a game involving a bottle with a narrow neck and strings in it, which had been attached to cone-shaped objects. Two people hold the strings and need to pull the strings out of the bottle. In this situation, the likelihood of accomplishment is based on the objective of the game. In the competitive version, the player who can pull out the object first will win. When both compete to pull

the strings together, this creates a jam in the bottle neck and neither wins. However, if their objective is to ensure that all the objects are taken from the bottle within a certain amount of time, they have an incentive to coordinate their efforts and avoid creating a jam in the bottle neck. Each player can decide whether to wait or pull a string to ensure that the cones come out one by one.

In the second case, Ullmann-Margalit (1977, p.129-130) illustrated a closer-to-life example of escaping from a burning theatre. In a crowded theatre, if the fire alarm goes off and the fire spreads quickly, there will be a struggle for the exits, which results in few people escaping alive. But if the fire alarm gives an early warning and the fire spreads slowly, everyone remains orderly and calm. They evacuate the theatre smoothly, with a high chance that everyone will get out alive.

Solving this coordination problem requires shared information regarding the problem (fire) and the understanding of the solution (being calm and orderly when evacuating the theatre) (Cronk & Leech, 2013, p.125). This clearly shows that communication is actually the key to creating information and understanding, from which develops common knowledge.

In a protest situation, the likelihood of people joining the protest will increase when there are signals that the government is becoming less efficient or that the opposition is becoming more efficient (Kuran, 1991). Participating in protests involves private costs. Logically, the individual may only be willing to bear the cost after they gain sufficient information about the protest. When they know that the protest will increase in size, the individual gains more confidence as the likelihood of repression or risk has fallen. This increases the number of people participating in the protest. Technically, this situation is different from the free-rider problem; it is generally known as the coordination problem.

A simple coordination game about protests involves a two-player setup, Player A and Player B. As in the coordination scenario, both players possess the common knowledge that to make the protest succeed, they have to cooperate.

Each player chooses their strategy based on what the other player will do. Considering that values between -1 and 2 apply to the individual strategies, a

lower value is less preferable as it means a lower chance of benefiting (the protest is a success) and a high cost (e.g. the person is arrested by the police). A higher value is a better option as it means a higher chance of benefiting and a low cost.

Table 4-2: Coordination Problem in Protest

		Person B	
		Protest	Stay at home
Person A	Protest	2, 2	-1, 0
	Stay at home	0, -1	1, 1

Notes: The payoff value on the left of each cell is paid to Person A, that on the right is paid to Person B.

Adding the two values in each cell results in the outcome payoff. When both players protest (2,2), they will receive a high outcome payoff of 4. As they joined the protest together, they increased the chance that the protest would succeed. If neither protests and both stay at home (1, 1), they will a get low outcome payoff of 2. Neither bore any cost but they decreased the chance of the protest's success. In the next-worst scenario, if either person A or B goes to the protest and the other stays at home, they both get the outcome payoff of -1. The person who went out to protest paid all the cost without receiving any benefit (-1), while the person who stayed at home may not have paid any cost but they eliminated their chance of gaining any potential benefit, denoted by 0. In the coordination scenario, making the opposite choice is known not to be mutually beneficial. This is because protest activity is risky and large numbers of participants are required for it to succeed. If the players split, only one person takes the cost and the other stays at home. Both know there is no chance of success, while this situation also increases the risk that the one who goes out to protest will get arrested or punished by the authorities.

Interestingly, in this game, there are two intersections of best responses. One is that both players go to protest; second, both players stay at home. Table 4-2 shows that if either person chooses to go to the protest, the best outcome for the other person comes when they do the same (2,2). Similarly, if either chooses to stay at home, the best outcome for the other person comes from also staying at home (1,1). In other words, this game involves two equilibria: both players either go to protest or stay at home. More interestingly, in this matrix, when the outcome from staying at home is not optimal for both players, both may simultaneously

translate from a small payoff outcome to a maximal payoff outcome by choosing to join the protest.

This is because the response of each player in this coordination game is interdependent with that of the other. Generally, the best payoff comes from working together. If person A chooses to protest, person B should also choose to protest; if person B chooses to stay at home, person A should also choose to stay at home. The game has two equilibria and one outcome is highly desirable. Both players know that if they stay at home they lower the chance of the protest's success and they will be less likely to gain the optimal outcome. Coordination is required to change the status quo, while neither player benefits from free-riding on the other.

Therefore, achieving better outcomes in this scenario requires coordination, which involves communication. Every player has to reach an agreement and coordinate in order to achieve the optimal payoff, which comes from protesting rather than staying at home. The matrix in Table 4-2 captures the incentive structure of the potential protest participation. The players will not achieve the optimal payoff if they do not communicate to develop a level of common knowledge. This is a real-life feature of protest mobilisation that cannot be captured by the collective action model.

The key to solving the coordination problem is common knowledge (Cronk & Leech, 2013). Scholars have conducted many experiments and outlined several strategies for developing common knowledge (Cabrales et al., 2007; Hellwig, 2002; Michael Suk-Young Chwe, 2001). People need to know and understand a situation before they can participate in it or take any responsibility (Micheletti, 2006). Social mobilisation cannot happen if no informing activity exists.

Overall, the collective action and coordination models each have specific strengths. The key difference between these two models is that the collective action model stresses the ability to free-ride, which could undermine the production of the collective good. However, in the coordination model, the game emphasises the importance of coordination to bring about a change to the status quo. Any activity involving change or movement requires coordination to some

extent, while the ability to free-ride or not depends on the minimal size needed to bring about a change of status quo (which could be a function of regime strength). In this scenario, the coordination model seems a more fundamental and appropriate way to comprehend protest activities. As the game has two equilibria and no strictly dominant strategies, this model highlights the role of communication: protest activities require actors to coordinate through communication.

Communication Technology

The theoretical discussion above suggests that coordinating an action is impossible without communication, which raises a question: to what extent does communication matter in protest activities? The following section further discusses the role of information and communication technology, which influences the coordination model.

Communication technology can be the key to political motivation on the most important level, which is the grassroots (Eyck, 2001). One recent study found that communication plays an important role in risky political actions such as protests (Barberr & Jackson, 2019). Today's advanced communication technology has the potential to solve the coordination game.

The fundamental way to develop common knowledge is communication. One-to-many communication (like regular mass media) might work if the sender is highly credible. However, social media has an advantage as it allows two-way interaction and all users can see and individualise the same aspects.

Consider again the outcome from Table 4-2 above. To get the maximal outcome payoff, the information about the protest and its benefit must be clear. When the protest information is unclear, the benefit of the protest is also unclear. If the benefit is equal to or greater than 2 in this situation, everyone would protest (all the time). But if the protest's benefit is less than 1, nobody would protest (all the time). In the most unfavourable situation, an outcome from -1 to 0, the coordination problem will occur. Resolving this situation depends on who does what, which is coordination in a higher-order belief.

Social media is particularly suited to being adapted to this scenario as it provides individual information about common elements, which enables coordination. Social media provides coordination signals such as “like”, “share”, and “re-tweet”. This is not the case with conventional mass communication media, in which everyone receives the same information, but no one knows the responses of others.

ICT provides two-way or multi-way forms of communication. ICT tools such as Facebook, Twitter, cross-messaging platforms, and micro-blogging allow the transmission of considerable volumes of information, facilitating the establishment of common knowledge. An online interaction system regularly consists of several major components, such as aggregate information, that indicate, for instance, the total amount of reviews and the average user rating. Some websites offer rating distributions. Besides these facilities, online information contains not only abstracts and reviews but also materials such as status and expertise. Supporting materials provide remarks and helpfulness ratings. Along with these observations, Qiu and Li (2010) argued that internet information seems to establish elements of persuasion that form a user’s “attitude and decision-making patterns” (p. 1553). In other words, with ICT, protest coordination seems much easier to establish as cooperation with others becomes highly efficient while simultaneously solving the coordination problem.

Protest information alone will not increase protest participation or create more protests, but information with coordination details such as the number of likes or shares should increase the likelihood of protest onset. Protest participants might avoid joining a protest if they lack information about everybody else. ICT not only allows people to see what others think, but also permits the user to become informed about the level of agreement with what other people think.

These facts provide an important theoretical foundation on which to examine the global trend of protest relative to the ICT mechanism. Therefore, empirically observing the effect of the ICT mechanism on protest is crucial. It is argued that exposure to the ICT mechanism would result in a different outcome from exposure to conventional mass media. It is argued that as the internet

provides more efficient communication, multiple bidirectional interaction, and crosses geographical boundaries in real time, connectivity will differentiate protest outcomes between people with access to the internet and people without. In addition, the ICT mechanism provides coordination signals that allow people to know how others think and act. Indications from highly interactive or popular social media platforms will make people more confident about joining a protest. Thus, in this paper, it is hypothesised that: The tendency of protest occurrence will increase when people have internet connectivity, and the effect will be stronger with high interaction signals. Moreover, if the interaction signal does the work, then the high interaction signals should have a significantly higher impact than the conventional mass media. It also expected to see there should be no difference in mobilization between the high interaction signals of social media and conventional mass media on the people who do not have an internet connection.

4.3 Operational and Design

To assess the theory, a survey experiment was carefully designed to explore the effect of communication/ICT on people's willingness to protest. To evaluate this, the researcher examined variations in internet connection (in villages), time period (using a two-wave survey) and treatment (using show-cards).

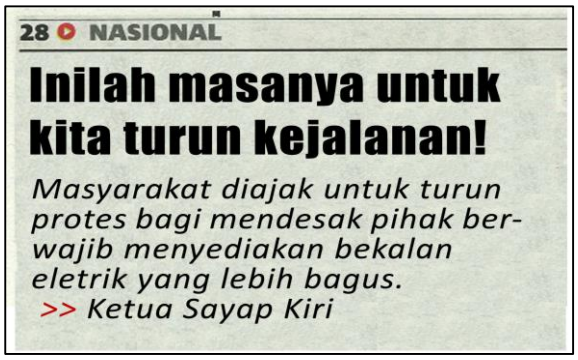
A two-wave survey experiment was undertaken in six rural villages in Malaysia. Split randomisation was applied, which allowed the respondents to be selected randomly. Each respondent had an equal probability of being assigned to one of three different treatments: ICT Popular, ICT Non-Popular, and Newspaper Clipping. In testing the underlying mechanism, it was assumed that people recognised the importance of a message by value-added information in social media (the number of likes/shares) and, if they did, this would impact their behaviour. For the respondents to understand this stimulus, the message of protest was modified based on locality information and issues. The content information in the treatment was identical, but they differed in two distinct ways. Two treatments resembled information from a social media platform, but only one

of these contained relevant information that suggested coordination of the action (popular). Another treatment was the newspaper clipping, which was regarded paper as the baseline in the analysis. In the first step, each respondent was given dice to roll. The dice results determined the show-cards (stimulus) which contained information on protest.[55] A dice score of one or two led to a Newspaper Clipping, a score of three or four produced ICT Popular, and a score of five or six led to ICT Non-popular. This technique ensured the assignment of the stimulus was thoroughly based on chance. The technique was only applied during the first-round interviews. In the follow-up interviews, the respondents were given the same show-card as they received in the first-wave survey.

Background to the hypothetical scenario

In the hypothetical scenario, the respondents were asked questions based on the show-cards they received through the dice score. The content in the show-cards was identical, and they only differed in context. The newspaper stimulus (Figure 4-1) was specifically designed to display a newspaper cutting. Both ICT Popular (Figure 4-2) and ICT Non-popular (Figure 4-3) had been designed to display the Facebook layout. The show-cards treatments utilised were as follows:

Figure 4-1: Newspaper Cutting Treatment



Translated:
Headline (bold) : Now is the time for us to take to the streets!
Sub-headline (italic): The public is called to protest to urge the authorities to provide better electricity supplies - Left-Wing Chief

[55] The information on show cards ICT Popular and ICT non-popular are following Facebook layout as it is the most common social media platform in Malaysia. http://gs.statcounter.com/social-media-stats/all/malaysia

Figure 4-2: ICT Popular Treatment

Translated:
Now is the time for us to protest on the streets to uphold our rights to get a better quality of electricity!!

Figure 4-3: ICT Non-Popular Treatment

Translated:
Now is the time for us to protest on the streets to uphold our rights to get a better quality of electricity!!

This hypothetical scenario was designed to represent the points highlighted in the theory. The same protest information was used in all three show-cards. As the theory suggested, communication is the key to developing general knowledge, so the ICT mechanism not only provided the information but also allowed each user to see what others thought and did with the information. Figures 4-2 and 4-3 provide information on what others were thinking about the protest message. Figure 4-2 represents Popular ICT, which had a high number of shares and likes, while Figure 4-3 represents Non-Popular ICT, with a low number of shares and likes. Figure 4-1 contains only information on the protest without signalling other responses to the protest message. Based on the theory, it was hypothesised that people with internet accessibility treated with popular ICT would display a positive reaction to the protest compared to other treatments.

Previous researchers have found that social media plays a significant role in protest activity (Ivey, 2015; Little, 2016; Sebastián Valenzuela et al., 2012; Yunus, 2013). However, all these studies are limited by a common unresolved question: do people participate in protest due to new communication tools or the issues at stake? To resolve this through assessment, a specific design was developed for this study by controlling the content relating to the issues.

The content of all the show-cards referred to inviting people to go into the streets to protest. The issue displayed on the stimulus instrument concerned a basic necessity, electricity. The reason for using a basic need as the issue in the show-cards was to gather universal attention across all political backgrounds. This scenario was measured by two items: (1) going to the protest and (2) the importance of the message. A ten-point Likert-type scale was used for each item, with *not at all* and *certainly* as the anchors. The effect of each treatment was measured by each respondent's intention to join the protest and how they valued the information. The first respond variable was treated as the main focus of this study and the following respond variable was used in the manipulation check.

The evidence from past studies strongly suggests that differences and income inequality affect population health and well-being; this incorporates the theme of violence (Pickett & Wilkinson, 2015). Moreover, Internet use differs within a demographic. Internet use for communication, education, entertainment, and other purposes varies (Karacic & Oreskovic, 2017), so controlling for these variables was necessary.

To control the unwanted influences in this approach, several major elements were identified as individual confounding variables, such as general demographic details like individual income, age, race, gender, religion, region, and education. These elements were further refined since this approach investigated the individual level. Individual-level attitudinal and demographic factors are important factors influencing individual political activities (Tolbert & McNeal, 2003).

Village Selection

Using the information on the coverage expansion plan,[56] three pairs of villages were identified that had no or limited Internet access at time *t*. They shared similarities in terms of socio-economic status and locality but Internet access at time *t*+1 differed within each pair.

To select the treatment and control villages, the researcher first selected roughly 22 villages that were similar in size and location. The number was narrowed to 10 to 15 villages based on similarities between them, including the distance to the main city and the local industry. Secondly, the researcher visited the targeted villages to collect further information by meeting the local people and asking further background questions about each village.

Based on that information, the sample was further reduced to the six villages in which the actual survey would occur. Villages A, B, and C were the experimental group, while villages D, E, and F were the control group. The village pairs were A-D, B-E, and C-F. Villages D, E, and F still had no Internet access.

Time-based difference

A two-wave survey experiment was essential to capture the temporal effects of the internet. The wave 1 survey was performed from 14 November 2017 until 30 November 2017, whereby villages A, B, and C received Internet coverage access shortly after the initial survey. The wave 2 survey (*t*+1) lasted from 4 March 2018 until 31 March 2018. The same questionnaire was used for the wave 1 and wave 2 surveys to gather information on political behaviour and interactions across all the villages at the different points in time. All adults (those aged 18 and above) were asked to participate in the survey. Each survey questionnaire was completed in person by a trained enumerator. An interview was held individually with each respondent[57] to ensure that every respondent felt free to voice his/her actual opinions and concerns. The total number of observations was 582, whereas

[56] See appendix "A" for detail on coverage expansion plan – New Tower location
[57] See appendix "B" for Procedure details

the setup sample for each group was 300. The survey process was reasonably successful despite the small rate of attrition during the follow-up.

Empirical strategy

To assess the hypothesised assumption, linear regression analysis was conducted to estimate the explanatory impact of the ICT mechanism on protest. The following models were used with interaction estimators. The estimation was divided into three models: 1) the social media effect model, 2) the popularity effect model and 3) the full specification model. The aims of Equation 1 and 3 were to assess the existence of effects from overall social media and popular social media, compared to the newspaper treatment. With Equation 2, the aim was to identify whether a popularity effect exists regarding social media posts compared to non-popular social media posts. The baseline for models 1 and 3 was set to the respondents who received the newspaper treatment in the non-internet villages in the first data collection (wave one). In model 2, the baseline was set to the respondents who only received the non-popular social media treatment. The social media effect model in Equation 1 estimated the internet's effect by accommodating each regressor as follows:

$$\begin{aligned} Protest\ (Y_{it}) = {} & \alpha + \beta_1 SocialMedia_{it} + \beta_2 VillageGroup_i + \beta_3 Wave_t \\ & + \beta_4 (SocialMedia_{it}\ X\ Wave_t) \\ & + \beta_5 (SocialMedia_{it}\ X\ VillageGroup_i) \\ & + \beta_6 (Wave\ X\ VillageGroup_i) \\ & + \beta_7 (SocialMedia_{it}\ X\ Wave\ X\ VillageGroup_i) + \epsilon_{it} \end{aligned} \quad (1)$$

where the outcome of Y_{it} is a dependent variable measuring the intention to protest of the respondent, in a Village *i* in wave *t*. Social Media, Village Group and Wave are the main factors.

Social Media treatment, whereby non-popular posts with low likes and shares and Popular Facebook treatment posts with high numbers of likes and shares were collapsed into one new explanatory variable, denoted as Social Media. This variable aimed to capture the overall effect of social media, which was coded

using dichotomous indicators: social media stimulus, popular or unpopular, is coded as 1 and otherwise 0. Village Group represented villages with internet connection is coded as 1 and otherwise 0; Wave represented the second round of data collection is coded as 1 and otherwise 0.

The coefficient of β_4, β_5 and β_6 were two-interaction terms of SocialMedia X Wave, SocialMedia X VillageGroup, Wave X VillageGroup, while β_7 was the three-way interaction term, SocialMedia X Wave X VillageGroup. Whereas ε represented the error terms of the model.

The interaction term was used to reveal the effect of the internet on protest. The dependent variable was affected when the conditions of the other predicted variables were met. In this case, the dependent variable (who would join a protest or not) was influenced by the association between the treatment stimulus social media (popular and non-popular treatment), the village group (villages with internet) and the wave (the second round of data collection after the internet had been introduced). In any situation when any predictor was absent, the dependent variable changed, whether this was positive in relation to protest or otherwise. In this model, the specification revealed the general effect of social media compared to the newspaper baseline.

If the social media information (Facebook treatment) established common knowledge among people and increased their confidence to participate, a positive and statistically significant outcome Y for β_7 would be expected, indicating the likelihood that protest participation increased after people had been exposed to social media in the second wave in a village that had received internet connectivity.

$$\begin{aligned} Protest\ (Y_{it}) = {} & \alpha + \beta_1 PopularICT_{it} + \beta_2 VillageGroup_i + \beta_3 Wave_t \\ & + \beta_4 (PopularICT_{it}\ X\ Wave_t) \\ & + \beta_5 (PopularICT_{it}\ X\ VillageGroup_i) \\ & + \beta_6 (Wave\ X\ VillageGroup_i) \\ & + \beta_7 (PopularICT_{it}\ X\ Wave\ X\ VillageGroup_i) + \epsilon_{it} \end{aligned} \quad (2)$$

Equation 2 is more specific as it examined solely the possible effect of popular social media on protest and the joining effect on an internet village during the second wave. The baseline in this model was set to the respondents who received the non-popular treatment. The differences between Equations 1 and 2 concern β_1 and the interaction terms in β_4 - β_7. This model estimated the effect of popular social media treatments compared to receiving a non-popular treatment (a low likes and shares stimulus). If Popular ICT had a high coordination signal, increasing people's incentive to protest, it was expected that β_7 would be positive and statistically significant.

$$
\begin{aligned}
Protest\,(Y_{it}) = {} & \alpha + \beta_1 nonPopularICT_{it} + \beta_2 PopularICT_{it} + \beta_3 Wave_t \\
& + \beta_4 VillageGroup_i + \beta_5 (nonPopularICT_{it}\ X\ Wave_t) \\
& + \beta_6 (nonPopularICT_{it}\ X\ VillageGroup_i) \\
& + \beta_7 (PopularICT_{it}\ X\ Wave_t) \\
& + \beta_8 (PopularICT_{it}\ X\ VillageGroup_i) \\
& + \beta_9 (\ Wave\ X\ VillageGroup_i) \\
& + \beta_{10} (nonPopularICT_{it}\ X\ Wave_t X\ VillageGroup_i) \\
& + \beta_{11} (PopularICT_{it}\ X\ Wave_t X\ VillageGroup_i) + \epsilon_{it}
\end{aligned}
\tag{3}
$$

The full specification model in Equation 3 estimated the effect of popular ICT on protest compared to conventional media. Like the two former equations, the explanatory variables were dichotomous, whereby the outcome Y_{it} was a dependent variable measuring the intention of the respondent to protest, in Village *i* in wave *t*. This equation specified the constitutive terms of non-popular ICT and popular ICT treatment, making these four main single terms, five two-way interaction terms and two three-way interaction terms. Note that no respondents will receive both the non-popular ICT and popular ICT treatment in the survey experiment. Hence, interactions between these two indicators will always be zero and are therefore dropped.

The variables in Equation 3 consisted of non-popular social media treatment with a low number of likes and shares coded as 1 and otherwise 0. The popular ICT treatment with a high number of likes and shares coded as 1 and otherwise 0. For the Wave, the second round of data collection, which was coded

as the second round of data collection equal to 1 and otherwise 0. Internet Villages represented the village group with internet connection, where 1 denoted a village with internet, and otherwise 0. Also included are the following interaction terms: non-Popular ICT X Wave, non-Popular ICT X Internet Village, Popular ICT X Wave, Popular ICT X Internet Village and Wave X Internet Village. The three-way interaction terms were as follows: non-Popular ICT X Wave X Internet Village, Popular ICT X Wave X Internet Village. Meanwhile, ε represented the error terms of the model obtained.

Building from the theoretical discussion, the internet's effect on protest should increase when people were exposed to high coordination signals (popular social media) in the second wave in the villages that received internet connection. It is expected that β_{11} be positive and statistically significant. When people are exposed to the low coordination signal (non-popular social media) in the second wave in the internet villages, the coordination effect is anticipated to be weaker. Hence, it is expected that the β_{10} coefficient is smaller compared to β_{11}.

4.4 **Analysis**

To identify the effects of ICT on protest onset, the operation was based on three components: the perpetration of (1) the groups with internet and without internet on (2) the protest mechanism instrument (the stimulus), as well as (3) the time-based difference between before the internet became available and afterwards. Comparing the coefficient estimates between these three components enabled the differences in public attitudes to protest to be accounted for. To execute the hypothetical test, dice were used to randomise the three different show-cards. The key outcome variable was recorded on a ten-point scale indicating the tendency of the respondent's behaviour to the given protest stimulus.

Table 4-3 presents the results of the chi-squared test for goodness of fit. Panel A shows the dice distribution statistics from the baseline interview (wave 1) for the entire sample, arranged by dice number. The test results show X^2 (2,

n=300) = 0.72, *p* = 0.698. This demonstrated that the dice was randomly distributed at a 0.05 significance level, indicating a failure to reject the null hypothesis. There is clear statistical evidence that the dice distribution was statistically indistinguishable.

Table 4-3: Dice Distribution.

Panel A: Baseline/wave 1				
Dice	Observed (N)	Expected (N)	Chi^2	p-value
1, 2	100	100	0.720	0.698
3, 4	106	100		
5, 6	94	100		
Total	300	300		
Panel B: Wave 2				
1, 2	92	94	0.595	0.742
3, 4	100	94		
5, 6	90	94		
Total	282	282		

Note: The table shows the distribution of the dice and the treatment given. In the table, there are two panels, Panel A and Panel B. The Dice column shows the pair of dice numbers, 1 or 2 = Newspaper Clipping show-card; 3 or 4= ICT Popular show-card; 5 or 6= ICT Non-Popular show-card. The observed column is the frequency of the pair number collected. The expected column is the expected value for the uniform distribution for the paired number of dice. Panel A shows the results from the data collection in wave 1, with the total N=300. Panel B shows the chi-squared results for wave 2, with the total N=282 after attrition.

The surveyed respondents were informed about the follow-up during the first round (wave 1) of data collection. After three and a half months, the follow-up survey (wave 2) was undertaken. The author managed to re-interview 282 of the 300 individuals from wave 1. The chi-squared test was re-run to determine whether attrition had disarranged the uniform distribution of the treatments. The chi-squared results for the sample in both waves, as presented in Table 4-3, Panel B, show (2, *n*=282) = 0.594, *p* = 0.742. The *p*-value obtained in the test was greater than the significance level alpha = 0.05. Therefore, the observed sample was not significantly different from the expected sample, which was consistent with the results from wave 1 (Panel A).

Table 4-4 shows the background statistics of the respondents who completed both surveys (in waves 1 and 2). The initial aim of experimental research is to ensure the attrition rate is below 20% (Amico, 2009). In this study, the attrition rate was successfully minimised to only 6%. During the follow-up survey, the same set of questionnaires was used to record the effect of the internet on protest attitude. For the following analyses, the respondents who could not be

successfully recalled for the follow-up interviews were dropped, so 282 respondents were involved in both waves 1 and 2.

Table 4-4: Profile Background.

Items		Group		χ^2	*p*
		Internet	*Non-internet*		
Age group					
	18-29	29	47	10.52	0.062
	30-39	34	42		
	40-49	24	24		
	50-59	25	17		
	60-69	21	10		
	70<	5	4		
Gender					
	Male	65	70	0.064	0.800
	Female	73	74		
Income					
	<RM 1,000	134	134	2.44	0.118
	>RM 1,000	4	10		
Education					
	Basic Education	129	130	0.963	0.326
	University	9	14		
Occupation					
	Private sector	10	6	8.390	0.211
	Government	3	6		
	Small business	74	58		
	Agriculture	37	56		
	Housewife	11	14		
	University student	1	2		
	Unemployed	2	2		
N		138	144		

Note: The table shows a statistical summary of the respondents' backgrounds from wave 1 and wave 2.

Tables 4-5 and 4-6 present the main results of the linear regression analysis of the mechanism effect on "Joining Protest". Table 4-5 presents the results from Equation 1 and 2, the social media effect and popularity effect. Table 4-6 presents the result from Equation 3, the full specification model. Tables 4-7 and 4-8 present the manipulation check of the main results, which was performed by substituting the criterion variable with the "importance of the message". These were regressed on the same predictor variables.

The results of the mechanism effect and manipulation check are presented in the same structure. In Tables 4-5 and 4-7, the four columns explain the variance between the two different models. Columns 1 and 2 present the coefficient results for the Social Media Effect model. Columns 3 and 4 contain the result of the

Popularity Effect model. Tables 4-6 and 4.8 only present the full specified interaction model. The odd-numbered columns present the coefficient without the control covariates. For the even-numbered columns, the following control covariates were included: gender, age, income, education and occupation.

Table 4-5: Mechanism Effects

	(1)	(2)	(3)	(4)
	Social Media Effect		Popularity Effect	
Join Protest				
Social Media	0.066 (0.429)	0.040 (0.440)		
Popular ICT			-0.009 (0.507)	0.061 (0.536)
Village Group	-0.978*** (0.394)	-0.876** (0.399)	-0.365 (0.494)	-0.279 (0.536)
Wave	-1.054*** (0.354)	-1.079*** (0.359)	-0.444 (0.469)	-0.392 (0.488)
Social Media X wave	0.253 (0.455)	0.279 (0.465)		
Popular ICT X wave			-0.634 (0.588)	-0.647 (0.615)
Social Media X Village Group	0.741 (0.532)	0.736 (0.548)		
Popular ICT X Village Group			0.258 (0.714)	0.311 (0.755)
Wave X Village Group	0.965** (0.413)	0.986*** (0.417)	-0.410 (0.601)	-0.440 (0.620)
Village Group X Wave X Social Media	-1.150** (0.572)	-1.175** (0.583)		
Village Group X Wave X Popular ICT			0.371 (0.806)	0.368 (0.833)
Control	No	Yes	No	Yes
R^2	0.065	0.10	0.056	0.10
Observation (n)	564	564	381	381
Cluster (n)	282	282	200	200

Note: The table presents the results of the observable treatment on protest joining/importance of message using linear regression. The dependent variables were recorded using ten-point Likert-type scales with "*not at all*" and "*certainly*" as the anchors. The independent variables are dichotomous. Social Media, either popular or non-popular treatment = 1, otherwise 0. Popular ICT, popular ICT treatment = 1, non-popular = 0. Wave, the second round of data collection, = 1, otherwise 0. Village Group, internet village =1, otherwise 0. Columns 1 and 3 show the estimates excluding the control variables, whereas columns 2 and 4 show the estimates including the controls. p<0.10*, p<0.05**, p<0.01***. Standard error in parentheses.

As the hypothesis predicted, public exposure to the internet positively increased protest participation, the effect of which is stronger when the coordination signal is convincing. Hence, to reveal the existence of the internet effect, Model 1 in Table 4-5 aimed to identify the general effect of social media on protest, while Model 2 aimed to identify the popularity effect of social media on protest.

In Table 4-5, the coefficients of the Social Media Effect Model reflect the average difference in protest participation between the respondents receiving the Newspaper Clipping treatments. A positive and significant result was expected for the key predictor variables, especially Social Media and the three-way interaction Village Group X Wave X Social Media. The three-way interaction in this model aimed to detect the general effect of the internet on protest behaviour. As the results demonstrate, the single-term Social Media predictor was statistically non-significant and the three-way interaction term showed a negative statistical significance at p=0.04, for both with and without the control variables. The two-way interaction of Wave X Village Group indicated positive and statistical significance, with p=0.02 and p=0.01 with and without the control variables, respectively. The single-term predictor Village Group and Wave showed a significant negative association with joining a protest. The p-value for the predictor Wave, for both with and without the controls, was p<0.01. For Village Group, the p-value without the controls was p=0.01, while the value with the controls was p=0.02.

From the theory, it was predicted that triple interaction would be positive, whereby people who received the social media treatment in the internet village and after they had experienced the internet (wave 2) would be more likely to protest compared to the people who received the newspaper treatment in the first wave in a non-internet village. However, the findings contrast with the predictions based on the theory. In this model, the three-way interaction indicated that the internet negatively affected joining a protest among the sample who received the social media treatment in an internet village during the second round of data collection. It was suggested that joining a protest decreased by 1.150 and 1.175 units for the shift from the absence (0) of the attribute to the presence (1) of the

interaction term by holding the other predictors constant. The variations (R^2 values) in this social media effect model, with and without the control variables, were 6.0% and 9.5%, respectively.

Model 2 in Table 4-5 illustrates the Popularity Effect Model, which is the key interest in this study. It was expected that a significant role would be played by the popular internet mechanism relative to the non-popular internet mechanism. The predictor variables of ICT Popular and the three-way interaction between Village Group X Wave X Popular ICT were expected to be positively significant in terms of protest participation. Nonetheless, the results show that none of the key predictors reached a significant level in this model.

Table 4-6: Full Specification.

	(1)	(2)
	Full Specification	
Join Protest		
Non-popular ICT	0.072 (0.502)	0.029 (0.529)
Popular ICT	0.062 (0.494)	0.068 (0.503)
Village Group	-0.978 (0.396)***	-0.870 (0.402)**
Wave	-1.054 (0.355)***	-1.070 (0.362)***
Non-popular ICT X Wave	0.609 (0.588)	0.629 (0.608)
Non-popular ICT X Village Group	0.612 (0.633)	0.578 (0.667)
Popular ICT X Wave	-0.024 (0.498)	-0.004 (0.509)
Popular ICT X Village Group	0.870 (0.650)	0.882 (0.659)
Wave X Village Group	0.965 (0.415)**	0.977 (0.419)**
Non-popular ICT X Wave X Village Group	-1.375 (0.729)*	-1.378 (0.747)*
Popular ICT X Wave X Village Group	-1.004 (0.676)	-1.039 (0.689)
Control	No	Yes
R^2	0.065	0.10
Observation (n)	564	564
Cluster (n)	282	282

Note: 1. The indicator Popular ICT X Non-popular ICT was non-overlapping, meaning that one is 1 and the other must be 0, all would be constant. Therefore, interactions between these two indicators were removed from the result.

2. The table presents the results of the observable treatment on protest joining/importance of message using linear regression. The dependent variables were recorded using ten-point Likert-type scales with "*not at all*" and "*certainly*" as the anchors. The independent variables are dichotomous. Non-popular ICT, non-popular ICT treatment = 1, otherwise 0. Popular ICT, popular ICT treatment = 1, otherwise 0. Wave, the second round of data collection = 1, otherwise 0. Village Group, internet village = 1, otherwise 0. Columns 1 and 3 were the estimates excluding the control variables, whereas columns 2 and 4 were the estimates including the controls. p<0.10*, p<0.05**, p<0.01***. Standard error in parentheses.

As predicted in the hypothesis, exposure to the internet increased protest participation, with a stronger effect when the coordination signal is convincing (a high number of shares and likes). Table 4-6 presents the result of Model 3, the fully specified interaction model, to address the existence of a popular social media effect relative to the newspaper treatments. In this full specification model, it was expected that the three-way interaction predictors of Village Group X Wave X Popular ICT would be positively and significantly associated with protest participation. However, the results show that the focused key predictor was non-significant.

The three-way interaction between Non-Popular X Village Group X Wave showed negative statistical significance, with *p*-values = 0.06 for both with and without the control variables. From this predictor variable, it was suggested that exposure to non-popular social media would lead to less protest, considering that the shift from the absence of the attribute in the interaction term = 0 to the presence of that attribute in the interaction term =1 would decrease protest participation by 1.375 and 1.378 units, respectively.

The two-way interaction of Wave X Village Group indicated positive and statistical significance, with p=0.02 for both with and without the controls. The addition of four two-way interactions in this model produced no effects, as the results were statistically insignificant. Two predictor variables, Wave and Village Group, were shown to be negative and significant, with p<0.01 for without the controls. Including the controls, the Wave and Village Group predictors were significant at p<0.01 and p=0.03, respectively. The R^2 values in the full specification model were 6.5% including the controls and 10% excluding the controls.

It is important to note that the analysis focused on the social media effects, especially on popular platforms. The estimates for the Wave and Village Group predictors appeared to be statistically significant, which reflected no theoretical expectation except that the variations in the estimates in all models were relatively small. Overall, the results from these three models illustrated no clear evidence to support the hypothesis.

Manipulation Check

The manipulation check was run on a different response variable, the "Importance of the Message". The specification was the same as that used with "Joining Protest".

Table 4-7: Manipulation Check - Mechanism Effect.

	(1)	(2)	(3)	(4)
	Social Media Effect		Popularity Effect	
Importance of Message				
Social Media	0.696 (0.497)	0.561 (0.528)		
Popular ICT			0.740 (0.539)	0.727 (0.548)
Village Group	0.789 (0.549)	0.651 (0.569)	0.118 (0.600)	0.290 (0.634)
Wave	-0.096 (0.623)	-0.034 (0.626)	-0.102 (0.562)	-0.040 (0.576)
Social Media X wave	-0.575 (0.705)	-0.529 (0.704)		
Popular ICT X wave			-0.981 (0.676)	-0.939 (0.697)
Social Media X Village Group	-0.810 (0.683)	-0.535 (0.699)		
Popular ICT X Village Group			-0.144 (0.815)	-0.058 (0.828)
Wave X Village Group	-0.759 (0.792)	-0.704 (0.793)	-0.359 (0.826)	-0.346 (0.863)
Village Group X Wave X Social Media	0.375 (0.955)	0.239 (0.960)		
Village Group X Wave X Popular ICT			-0.181 (1.075)	-0.300 (1.115)
Control	No	Yes	No	Yes
R^2	0.026	0.068	0.040	0.095
Observation (n)	564	564	381	381
Cluster (n)	282	282	200	200

Note: The table presents the results of the observable treatment on protest joining/importance of message using linear regression. The dependent variables were recorded using ten-point Likert-type scales with "*not at all*" and "*certainly*" as the anchors. The independent variables are dichotomous. Social Media, either popular or non-popular treatment = 1, otherwise 0. Popular ICT, popular ICT treatment = 1, non-popular = 0. Wave, the second round of data collection = 1, otherwise 0. Village Group, internet village = 1, otherwise 0. Columns 1 and 3 were the estimates excluding the control variables, whereas columns 2 and 4 were the estimates including the controls. p<0.10*, p<0.05**, p<0.01***. Standard error in parentheses.

The manipulation check was undertaken to examine the trend of the response to the predictive variable. The justification was grounded in the logic that if individuals perceived the "importance of the message" against the direction of the "joining protest" variable and this was positively significant, it could be concluded that the manipulation had been a success.

In Tables 4-7 and 4-8, the predictor variables and column models are arranged in a similar way to the mechanism effect estimate. In the social media effect model, the author expected that the coefficients of Social Media treatment and three-way interaction on Village Group X Wave X Social Media would be positive and significant in terms of the importance of the message. In the popularity effect model, the key predictors of interest - ICT Popular and the three-way interaction terms on Village Group X Wave X ICT Popular - were expected to be positive and statistically significant. However, in neither model were the predictors statistically significant.

Table 4-8 presents the full specification model. The expectation was that the important exploratory variables - the interaction terms between Village Group X Wave X ICT Popular - would be positive and significant. The results show that the main predictor terms in this model did not reach a significant level.

In Table 4-8, the result shows that the predictor of ICT Popular was positive and statistically significant, at p=0.06 without the controls. When the control variables were included, the coefficient was no longer significant. In this model, the R^2 values with and without the controls yielded variations of 3.3% and 7.5%, respectively. The results from the manipulation check (Tables 4-7 and 4-8) showed insufficient evidence to prove the contradiction of the mechanism effect (Tables 4-5 and 4-6); the manipulation check identified failure, so the consistency of these two main estimates failed to provide adequate evidence to support the hypothesis.

Table 4-8: Manipulation Check - Full Specification.

	(1)	(2)
	Full Specification	
Importance of Message		
Non-popular ICT	0.262 (0.591)	0.144 (0.628)
Popular ICT	1.00 (0.544)*	0.863 (0.572)
Village Group	0.789 (0.551)	0.664 (0.571)
Wave	-0.096 (0.625)	-0.035 (0.628)
Non-popular ICT X Wave	-0.006 (0.840)	0.036 (0.848)
Non-popular ICT X Village Group	-0.670 (0.815)	-0.432 (0.845)
Popular ICT X Wave	-0.988 (0.731)	-0.941 (0.729)
Popular ICT X Village Group	-0.815 (0.780)	-0.522 (0.785)
Wave X Village Group	-0.759 (0.795)	-0.707 (0.796)
Non-popular ICT X Wave X Village Group	0.399 (1.152)	0.283 (1.170)
Popular ICT X Wave X Village Group	0.217 (1.046)	0.076 (1.054)
Control	No	Yes
R^2	0.033	0.075
Observation (n)	564	564
Cluster (n)	282	282

Note: 1. The indicator Popular ICT X Non-popular ICT was non-overlapping, meaning that one is 1 and the other must be 0, all would be constant. Therefore, interactions between these two indicators were removed from the result.

2. The table presents the results of the observable treatment on protest joining/importance of message using linear regression. The dependent variables were recorded using ten-point Likert-type scales with "*not at all*" and "*certainly*" as the anchors. The independent variables are dichotomous. Non-popular ICT, non-popular ICT treatment = 1, otherwise 0. Popular ICT, popular ICT treatment = 1, otherwise 0. Wave, the second round of data collection, = 1, otherwise 0. Village Group, internet village = 1, otherwise 0. Columns 1 and 3 were the estimates excluding the control variables, whereas columns 2 and 4 were the estimates including the controls. $p<0.10$*, $p<0.05$**, $p<0.01$***. Standard error in parentheses.

The majority of the statistically significant results were negative. In these results, the predictor Wave consistently presented in a negative manner, suggesting that respondents may not have interpreted the treatment as anticipated. Like the responses to joining a protest, the respondents consistently judged the importance of the message to be lower in Wave 2 compared to Wave 1, suggesting that respondents reacted differently after they had received the internet. The results of the three-way interaction term from the mechanism effect model (full specification) showed findings that strongly contradicted the hypothesis.

The second-round survey (Wave 2) was collected in the run-up to an election campaign, which might account for the differences between the results

and the theory. Citizens might be less willing to protest in the run-up to an election. However, this pre-election collection period cannot account for the absence of an effect, as a lack of significant evidence for an effect was obtained in the first-round survey (Wave 1). The alternative estimation was also run and the results consistently failed to show that the ICT mechanism had any effect on protest (details given in Appendix D).

4.5 Conclusion

The theoretical framework indicated that ICT would expedite the mechanism of protest. This argument was tested on the medium of communication and the internet itself, the results of which contradict the general claim that ICT is an effective form of communication for citizen movements, especially protest coordination.

Using a totally different design to that found in the existing literature and with a rural sample of subjects, the results from the linear regression analysis show no convincing evidence that ICT affects protest behaviour. The findings suggest that several factors may be involved.

One main potential issue from these findings is that the treatment may not have worked effectively. The author further analysed the mechanism underlying the theoretical argument, which involved the importance of the message.[58] This theory predicts that people should conceive popular posts as more important and convincing. If one gets a signal that many others are going to protest, (through the high number of likes and shares in the popular Facebook treatment), the message to ensure coordination among participants will be more important. The results show no clear difference between the importance of messages on social media and those on conventional media. Additionally, this explains that within the social media context, the popular post did not appear to be important. This was

[58] I test this variable using similar procedure with main predictor variable, see appendix "B".

consistent with the results for the main estimate, joining the protest, which also failed to suggest that ICT affects attitudes to protest.

The striking result from the predictor Wave in both tables (Tables 4-5 and 4-6) is the consistently negative effect of ICT on protest after the subjects had received the internet connection. One potential explanation for this is that the respondents may have been sceptical about the new online information. Individuals may have answered positively during the baseline (as they had no experience of the internet) but when they had received the treatment (internet), they developed new perceptions of online information. They may also have been aware of conventional media stories about the (possibly many) negative aspects of the internet, such as internet scams and fake news.[59] This may reflect the responses in the second wave survey after people had started to experience the internet for themselves, when they become more cautious about choosing which information to trust.

The second explanation for the negative influence of ICT on protest attitudes could be that people generally hesitated to protest. They were not expected to change their willingness to join a protest after experiencing the internet, but at least a minor effect was expected. A literacy effect may be involved here, indicating people who had experienced the internet or at least had been exposed to it. The effect of undertaking the survey outside an election period (wave 1) seemed more relevant than during the run-up to the election period (wave 2).

The third possible explanation is the free-riding loop. Given two types of social media stimulus, ICT Popular (a high number of likes and shares) and ICT Non-Popular (a low number of likes and shares), it is possible that they are meaningful in contributing similar effects. When someone sees there is already a high number of likes and shares, he or she may be less likely to contribute or, in this case, to acknowledge the information. When they see an already high rate of support for a protest, this might make them believe the chance of success is higher

[59] Telenor Group (Norway) has done one survey on internet scams in south East Asia in 2017. From the result 46% victims of internet scams from 400 samples are Malaysian.

and potentially cause them not to show an intention to protest. This condition aligns with previous work by Oliver (1984), who stated that collective goods will be provided through the efforts of others.

Respondents who received the cards with few likes and shares might consider that the information they received had no chance of success, unlike an important message. They might also have thought that not many people in their circle or network were overly concerned about the information, making them feel it was less important to act on. As discussed initially, when no communication is involved, people do not know what to expect, thus causing them to free-ride. However, when a communication element is involved, the available information seemed to give more certainty to the public about free-riding. This probability scenario contradicts the study hypothesis, which could arise by chance. It cannot be readily determined but it undoubtedly has potential.

It is also important to note that in this study, the playing cards used as the stimulus only used the Facebook layout. It is unclear whether the respondents with internet connection had their Facebook accounts or not during the time interval between waves 1 and 2. Therefore, the possibility of unfamiliarity with the layout might also have been a limiting factor. Furthermore, the use of an anonymous person in the treatment may also have contributed to people ignoring the mechanism signal.

For future researchers, a number of recommendations can be suggested. First, the field experiment design should be applied in different areas over a longer period. Second, it is also important to consider more variance in economic distribution. Grasso and Giugni (2018) recently found that economic distribution plays a major role in extra-institutional activities. Thirdly, it is highly recommended that future researchers consider different treatment layouts with several sets of coordination signals.

Overall, the results in this study showed lack of evidence to confirm that ICT affects protest occurrence. On the other hand, it was indicated that ICT has a dynamic influence on users by inducing a change in public opinion. ICT will continue to operate as a powerful independent variable in the field of political and

behavioural studies. Exposure to the internet may have an important long-term effect on political attitudes, especially extra-institutional activities. However, this may not apply in an immediate or short gap survey.

4.6 Appendix

A: New Tower Locations, Kuala Nerang District, Kedah, Malaysia

Table 4-9: New Tower Locations

	New Location / Tower Name	State	First Permit Payment	Go-live Date
1	*Kg Ulu, Tunggang Kanan (jalan ke Durian Burung)*	*Kedah*	*14/10/2017*	*14/11/2017*
2	*Kg Bidan, Mukim Tekai*	*Kedah*	*05/10/2017*	*05/11/2017*
3	*Kg Lubuk Rambai*	*Kedah*	*24/10/2017*	*24/11/2017*
4	*Kg Tandop (mukim Tekai)*	*Kedah*	*24/10/2017*	*24/11/2017*

Notes: The table shows the locations of the new telecommunication tower placements with internet capability (minimum of 3G connection). The selected samples are the villages that received coverage from the new tower. Source: District Office of Kuala Nerang/Pedu, Kedah, Malaysia.

B: Procedure Details

1- Within each group villages should differ in their likelihood of getting Internet access. Practical considerations also had to be accommodated, such as travelling distance, reachability, and costs. To limit the number of villages to 10-15, different villages were visited to collect further information by meeting the village chief, asking further questions, and seeking permission to survey members of the community. Based on that information, the sample was further reduced to 6 – 8 villages in which the actual survey would occur. All adults (aged 18 and above) were asked to participate in the survey. The details of the survey procedure are explained in the next section. From those six to eight villages (three to four were the control group and the remaining three to four were the treatment group), maps and all the house numbers were obtained. Each house was then randomly assigned to an enumerator team.

2- All the adult members of a household (18 years of age and above) were asked to complete the survey. In conducting the survey, the enumerators followed the same procedure for each household. Upon arrival, the enumerator team asked to speak to the head of the house (asking permission and explaining the study briefly). If permission was granted, the enumerators asked how many adults lived in the house. Among the adults, the enumerators started the survey with anyone who had most recently celebrated his/her birthday, followed by the next most

recent and so forth. Each respondent was clearly informed of the purpose of the survey and allowed to ask any questions to clarify any matter of concern.

3- Each respondent was informed about the survey individually and asked to sign the consent form. A copy of the consent details containing contact information was given to them. The targeted number of respondents was 60 to 100 per village. The interviews were held individually with each respondent to ensure that they felt free to voice their actual opinions and concerns. The overall targeted sample size was between 500 and 800 respondents. Each respondent was given a scale card to indicate their response to a particular question.

4- Each survey was completed in person by a trained enumerator. The author recruited and trained six to 10 enumerators (both male and female in roughly equal proportion) to collect the data. Enumerator training involved studying the background information about the research, a detailed introduction to the structure of the survey, and a mock interview, so that the enumerators would become familiar with the survey instrument and experience an interview situation once first-hand before going into the field. They were also trained on ethical considerations, such as a respondent's rights to refuse to answer and end participation at any time, as well as how to handle sensitive identifying information. Daily debriefings were held with all the enumerators during data collection.

C: Show-Cards

Table 4-10: Chi-Square by Show-Cards

Items	Show-Cards			χ^2	p
	Newspaper	*Popular*	*Non-popular*		
Age group					
18-29	24	22	30	15.93	0.101
30-39	22	31	23		
40-49	17	17	14		
50-59	12	23	7		
60-69	12	7	12		
70<	5	3	1		
Gender					
Male	44	45	46	10594	0.451
Female	48	58	41		
Income					
<RM,1000	88	98	82	0.189	0.909
>RM,1000	4	5	5		
Education					
Basic Education	84	95	80	0.0580	0.971
University	4	8	7		
Occupation					
Private	75	94	72	13.53	0.095
Government	6	0	3		
Housewife	9	8	8		
University student	2	0	1		
Unemployed	0	1	3		
N	92	103	87		

Notes: Newspaper Clipping show-card = dice score = 1 or 2, ICT Popular show-card = dice score = 3 or 4, ICT Non-Popular show-car = dice score = 5 or 6.

D: Alternative Estimations

The following tables (Table 4-11 – Table 4-14) presents the results of the observable treatment on protest joining/important of message (manipulation check) using linear regression. The structure of dependent and independent were the same as the main tables above. The sample who received Non-popular treatment was excluded from this estimation for Table 4-11 and Table 4-13. Whereas, for the Table 4-12 and Table 4-14, the sample was limited to the respondents who were only in the internet village.

Table 4-11 present the result of overall Popular effect compared to the people who received the Newspaper treatment, in Non-Internet Village during the second Wave. In the results, the single term of ICT Popular and the three-way interaction shows statistically non-significant.

Table 4-11: Overall Popularity effect

	(1)	(2)
	Popularity effect	
Join Protest		
ICT Popular	0.062 (0.494)	-0.032 (0.498)
Village Group	-0.978 (0.396)***	-0.871 (0.402)**
Wave	-1.054 (0.355)***	-1.177 (0.355)***
ICT Popular X wave	-0.024 (0.498)	0.072 (0.500)
ICT Popular X Village Group	0.870 (0.650)	0.940 (0.664)
Wave X Village Group	0.965 (0.415)**	1.063 (0.412)***
Village Group X Wave X ICT Popular	-1.00 (0.676)	-1.123 (0.684)
Control	No	Yes
R^2	0.079	0.122
Observation (n)	390	390
Cluster (n)	203	203

Notes: p<0.10*, p<0.05**, p<0.01***. Standard error in parentheses. This model tested for the sample who only received Popular treatment over the Newspaper treatment. The dependent variables were recorded using ten-point Likert-type scale with "not at all" and "certainly" as the anchors. The independent variables are in dichotomous. Popular ICT, popular ICT treatment = 1, otherwise 0. Wave, the second round of data collection, = 1, otherwise 0. Village Group, 1= internet village, otherwise 0.

In the following Table 4-12, the two-way interaction term aimed to capture the variance changes over time within the internet village. The regression analysis showed the interaction term for Popular ICT X Wave was negative statistically significant in the full specification model.

Table 4-12: Testing for Differential Time Effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Social Media Effect		Popularity Effect		Full specification	
Join Protest						
Social Media	0.808**	0.787**				
	(0.316)	(0.328)				
Wave	-0.088	-0.066	-0.855**	-0.749*	-0.088	-0.071
	(0.214)	(0.219)	(0.377)	(0.408)	(0.215)	(0.221)
Social Media X Wave	-0.897**	-0.898**				
	(0.347)	(0.364)				
Popular ICT			0.249	0.458	0.934**	0.998**
			(0.504)	(0.538)	(0.422)	(0.419)
Popular ICT X Wave			-0.263	-0.387	-1.029**	-1.072**
			(0.553)	(0.601)	(0.458)	(0.472)
Non-Popular ICT					0.685*	0.578
					(0.386)	(0.419)
Non-Popular ICT X Wave					-0.766*	-0.712
					(0.431)	(0.460)
Control	No	Yes	No	Yes	No	Yes
R^2	0.064	0.128	0.067	0.134	0.066	0.133
Observation (n)	276	276	184	184	276	276
Cluster (n)	138	138	96	96	138	138

Note: p<0.10*, p<0.05**, p<0.01***. Standard error in parentheses. This model tested for Internet literacy effect, which is the differential effects between first round data collection and second round data collection for the only village that received the internet. The dependent variables were recorded using ten-point Likert-type scale with "not at all" and "certainly" as the anchors. The independent variables are in dichotomous. Social Media, either popular or non-popular treatment = 1, otherwise 0. Non-popular ICT, non-popular ICT treatment = 1, otherwise 0. Popular ICT, popular ICT treatment = 1, otherwise 0. Wave, the second round of data collection, = 1, otherwise 0.

The results from Table 4-11 and Table 4-12 show that none of the main predictor variables had a substantial effect on protest activity. Majority of the coefficient were statistically significant in the negative manner. Therefore, there is no clear evidence of a difference in the overall effect between the respondent who received Newspaper treatment and Popular treatment and also it is lack of evidence to demonstrate a differential effect in either wave 1 or wave 2 of the survey.

D1: Alternative Estimation - Manipulation Check

The alternative estimation also has been tested on the outcome variable 'Importance of the Message'. Table 4-13 shows the results for the overall popularity effect, Table 4-14 present the result for difference time effect within the internet village. Overall, the manipulation check estimates was fail to detect

contradiction with the main estimate, hence there were lack of evidences to reject the null hypothesis.

Table 4-13: Manipulation Check- Overall Popularity Effect

	(1)	(2)
	Popularity effect	
Importance of Message		
ICT Popular	1.003 (0.544)**	0.791 (0.592)
Village Group	0.789 (0.551)	0.705 (0.594)
Wave	-0.096 (0.625)	-0.074 (0.642)
ICT Popular X wave	-0.988 (0.731)	-0.878 (0.734)
ICT Popular X Village Group	-0.815 (0.780)	-0.560 (0.798)
Wave X Village Group	-0.759 (0.795)	-0.603 (0.808)
Village Group X Wave X ICT Popular	0.217 (1.046)	-.041 (1.060)
Control	No	Yes
R^2	0.046	0.111
Observation (n)	390	390
Cluster (n)	203	203

Notes: p<0.10*, p<0.05**, p<0.01***. Standard error in parentheses. This model tested for the sample who only received Popular treatment over the Newspaper treatment. The dependent variables were recorded using ten-point Likert-type scale with "not at all" and "certainly" as the anchors. The independent variables are in dichotomous. Popular ICT, popular ICT treatment = 1, otherwise 0. Wave, the second round of data collection, = 1, otherwise 0. Village Group, 1= internet village, otherwise 0.

Table 4-14: Manipulation Check - Testing for Differential Time Effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Social Media Effect		Popularity Effect		Full specification	
Importance of the message						
Social Media	-0.113	0.030				
	(0.470)	(0.473)				
Wave	-0.856*	-0.762	-0.462	-0.462	-0.856*	-0.766
	(0.489)	(0.521)	(0.607)	(0.641)	(0.491)	(0.523)
Social Media X Wave	-0.200	-0.356				
	(0.645)	(0.685)				
Popular ICT			0.596	0.330	0.188	0.228
			(0.612)	(0.663)	(0.560)	(0.572)
Popular ICT X Wave			-1.164	-1.223	-0.770	-0.924
			(0.837)	(0.890)	(0.749)	(0.789)
Non-Popular ICT					-0.408	-0.183
					(0.562)	(0.577)
Non-Popular ICT X Wave					0.394	0.264
					(0.790)	(0.837)
Control	No	Yes	No	Yes	No	Yes
R^2	0.036	0.139	0.049	0.163	0.044	0.147
Observation (n)	276	276	184	184	276	276
Cluster (n)	138	138	96	96	138	138

Note: p<0.10*, p<0.05**, p<0.01***. Standard error in parentheses. This model tested for Internet literacy effect, which is the differential effects between first round data collection and second round data collection for the internet village. The dependent variables were recorded using ten-point Likert-type scale with "not at all" and "certainly" as the anchors. The independent variables are in dichotomous. Social Media, either popular or non-popular treatment = 1, otherwise 0. Non-popular ICT, non-popular ICT treatment = 1, otherwise 0. Popular ICT, popular ICT treatment = 1, otherwise 0. Wave, the second round of data collection, = 1, otherwise 0.

Chapter 5

SOCIAL NETWORKS AND PROTEST: AN INNOVATIVE APPROACH

5.1 Introduction

Protests have made global headlines, such as the "Occupy Wall Street" protest in New York City in 2011, the "Tahrir Square" protest in Egypt in 2011, the "Euromaidan" demonstration in Ukraine in 2013, and the "Gezi Park" protest in Turkey in 2013. It has been claimed that all were triggered by technological capabilities. Many scholars have studied these events (Barberá & Metzger, 2014; Ete & Taştan, 2014; Krastev, 2014; Lim, 2012; Tufekci & Wilson, 2012), and they largely agree that these social movements represented uprisings enabled by technology and social media, which have allowed people to share their goals and objectives in new ways. Protest participants use social media to inform others in their contact lists, connecting clusters of people who might join the protest.

The previous chapters have shown that social media may not foster mobilisation through coordination, as most previous research had suggested (Christensen & Garfias, 2018; Fergusson & Molina, 2019; Manacorda & Tesei, 2019; Pierskalla & Hollenbach, 2013; Van Laer, 2007). Several reasons may account for the lack of a direct effect. Quintelier and Vissers (2007) reported that young people in Belgium who spent more time on the internet did not participate in offline political activities. Rød and Weidmann (2015) conducted an extensive study of authoritarian countries between 1993 and 2010. Using their empirical evidence, they concluded that there was little evidence to support the claim that the development of ICT played a role in bringing extra-institutional political change. Hence, the role of ICT in social movements needs to be further investigated.

The previous chapters presented the analysis of the effects of ICT development on protest onset. It was found that the spread of ICT technologies in Malaysia was not systematically and consistently related to protest onset. The author then further investigated whether the theoretical claims that social media enables coordination had empirical support. Again, no systematic and consistent evidence was found for a coordination effect. This raises crucial questions: if some scholars and the broader public believe that the presence of social media is associated with more protest, through what means does the introduction of ICT contribute to protests? How does ICT affect protest mobilisation? The investigation proceeded by searching for the missing element, or at least a clue, by embarking on a new direction for research on protest and ICT. To comprehend the onset of protest, it was essential to address in greater depth the social network structure perspective.

Within the current discourse, social media is regarded as the key to a protest's success (Breuer et al., 2015; Elwood-faustino, 2014; Lim, 2012; Theocharis, Lowe, van Deth, et al., 2015). It seems widely accepted that ICT is a *Liberation Technology*, a term coined by Diamond et al. (2010). Although communication technology developments ultimately promote the efficiency of information dissemination, it remains crucial to understand how information spreads among people and how individual behaviour influences others. The change in the proliferation of protest worldwide was not only unprecedented but also underlined the importance of the human network in protest activity.

Social network studies have been unified through common cross-discipline conceptualisations of the complex structures amongst the entities being studied. The concept of social networks has been the prime influence in studies of complex (social) structures in various fields (Haythornthwaite, 2011). Existing research has shown that people with large social networks are more likely to participate in political activity (Klofstad, 2007b; McClurg, 2006). Metternich et al. (2013), for example, explored how network structures affect the strategic behaviour of political actors. Their results suggest that the network structure is an important factor in generating conflictual behaviour.

A study by Steinert-Threlkeld (2017) examined the role of central and peripheral networks, finding that peripheral networks have a greater ability to generate collective action and mobilise people, particularly in the context of large-scale protests in authoritarian regimes. Meanwhile, Siegel (2009) introduced a model of independent decision making within the social networks of individuals who had heterogeneous motivations to participate. His analysis focused on how networks prevent or contribute to protest, although he did not explain how networks emerge and affect the actors. Research by Hassanpour (2010) highlighted that denser and better-connected networks might not always result in more protest. That depends on whether a network connects people to more activists or more conservative members of society. The implications are that the distribution of political preferences in networks is primarily based on the interpersonal communication context, which shapes participation without taking into consideration the current and changing communication landscape.

ICT is capable of providing comprehensive information and communication. These capabilities modify and improve conventional human interaction, expand individual connections, and change their network structures, thus potentially aiding protest mobilisation. Hence, this chapter argues that ICT does not directly cause mobilisation but changes the political network in such a way that mobilisation (when attempted) is more likely to succeed. To support this argument, the relationship between social networks and collective action is discussed as this may be the main explanation for how each social network type influences protest mobilisation. In particular, the research draws on the work of Siegel (2009) on network typography and protest mobilisation. The following section discusses how specific ICT features affect the structure of political networks and link to a typography that aids mobilisation should it occur.

To empirically test the argument, the researcher collected and analysed exploratory longitudinal social network data from six villages in rural Malaysia. The data was collected for three matched village pairs across two points in time. Political and non-political networks were measured before and after one village in each pair was connected to the internet. Comparing the villages with and without the internet, (1) the political network typography in the villages receiving

internet access became denser, and (2) this effect was more pronounced in political than non-political networks. Although data limitations make these empirical analyses largely exploratory, this chapter offers a clear theoretical contribution supported by empirical findings. This work identifies how the arrival of ICT may affect politically relevant connectivity, which changes the structure of the political network. The evidence expands the theoretical understanding of how ICT may improve the efficiency of communication and affect political networks, as well as elaborating on the proposed network model of protest mobilisation developed by Siegel (2009). The study also highlights that the social network approach might be a fruitful way to study how ICT is related to protests.

5.2 Background Literature

This section briefly discusses how social network structures matter to protests. In the following section, a model is built and a hypothesis is formulated by considering the influence of ICT on social network structures.

Over time, society has developed and become more complex. Modern society faces new dynamic conflict in addition to traditional forms of discord such as gender-based issues, environmental issues, ethnic conflict, and religious conflict. Citizens are demanding to participate in governmental decision making, thereby initiating more democratic activities (Bagguley, 2004). The outcome of interaction within interpersonal networks is highly important for democratic activity (Mutz, 2002a). Several studies confirm that when interpersonal interaction concerning politics occurs on an informal basis, political implications arise (Bennett et al., 2000; Holbert et al., 2002; Klofstad, 2007a).

Network analysis examines the implications of the connection between social and political processes (Heaney & McClurg, 2009). In general, contention and mobilisation are made through relationships. The social network, which is founded upon interaction and communication, needs to be studied specifically, as does the link between social network structures and participation in contentious activities.

McClurg (2006) states that network structures enhance the probability of participation in political activities. Many other studies show a clear linkage between social network functions and political activities (Chwe, 2000; McAdam & Paulsen, 1993; Muller et al., 2001). Information dissemination within a personal social network has a higher influential value than other communication tools (Muller et al., 2001). Similarly, a study by Centola and Macy (2007) suggested that social networks provide an effective pathway for spreading contagious information. Highly connected nodes in a network spread the information, while, through the network, individuals use their knowledge of the network to guide their behaviour (McCubbins & Weller, 2020).

Protest mobilisation derives from network structures as people decide to join a protest movement or not based on the contacts within their network (Muller et al., 2001). Yenigun (2013) stated that the relationship between social networks and protest outcomes is driven by the social change that occurs when the relationship between an individual and the structure changes.

Larson et al. (2017) presented an analysis indicating that a person will take part in a protest when he feels there is great value in doing so. The way the individual sees/judges the value depends on what others think. The researchers used the large-scale data from Twitter activity during the Charlie Hebdo protest 2015 in Paris, which consisted of 130 million Twitter users. It has been determined that the structure of social media has an impact on protest participation. Moreover, a protest participant's network experiences positive growth compared to a non-protest network.

Generally, past approaches to studying protest have been based on two major theoretical assumptions. First, the theories used an epidemiological model to examine patterns in how people influence each other with a desire to protest and the complex exposure process (Centola, 2013; Centola & Macy, 2007; Muller et al., 2001; Siegel, 2009). Secondly, approaches have been based on the varied extent of the influence on an individual. A person is only willing to protest if his personal "threshold" is accomplished: enough people are involved or their close contact/s are going (Chwe, 2000; Granovetter, 1978; Watts & Strogatz, 1998).

Some studies in this field confirm that the structure of social networks plays a vital role in exercising collective behaviour that subsequently turns into action. In other words, these two theoretical assumptions about protest decision making involve the issue of "who you are connecting to". The influence of surrounding individuals on one's decision making and action are the main theme of this study. As the foundation of the social network is communication, a rapid growth in protest activism has been evident worldwide, especially over the past 10 years (Karatasli et al. 2018). Questions about how ICT development is connected to the growth of protest activity remain unanswered.

Furthermore, much of the research on social networks' influence on political outcomes has been based on unspecific populations (Growiec, Growiec, & Kamiński, 2018; Haythornthwaite, 2011; Lee, Choi, Kim, & Kim, 2014). Consequently, little is known about how ICT exerts an effect on social network structures to produce a political outcome, specifically protest onset. As Siegel (2009) confirmed, modelling a stimulated network expounds the structure's effect on protest. The current researcher made advances by incorporating the role of ICT into a social network and testing this with a specific sample. Using a specific sample of two different groups allowed the effects of ICT to be compared in a naturalistic setting. This enabled a better understanding of protest consequences through the changes in a network's structure. The current study focuses on the impact of ICT on a network's structure, its diversity, and its interaction characteristics, thus highlighting how structure network changes contribute to protest.

5.3 Model of Social Network Structure and Protest

The literature indicates that political activism, especially protest participation, does not flow through social networks without explicit mobilisation efforts through individual interaction. This somehow generates decision making. This section presents a model of a social network structure's effects on individual decision making about protest activity by taking into account the influence of ICT. The section is structured as follows: 1) individual decision making, 2) network

structure types, 3) key ICT features, and 4) how ICT features change a network structure. The interrelationship between these concepts was summarised as one hypothesis, as discussed at the end of the section.

Individual Protest Decision

Siegel (2009) assumed that an individual's motivation to participate consists of two components. The first was described as *net internal motivation* (b_i) and the second as *net external motivation* ($c_{i,t}$).

Net internal motivation captures the influence of the various internal stimuli on the participation decision. Individuals may have different preferences. For example, some may enjoy risk taking, some are easily agitated, and one might prefer radical politics while others do not. Ultimately, the independent decision of the individual is to either challenge the current state by expressing political revolt affecting social change or initiating actions susceptible to risk and cost, which they are forced to bear and which may include the loss of their career, jobs, business, and/or social relations.

The second component, *net external motivation* ($c_{i,t}$), covers the external influences on an actor's participation decision. For example, if our peers join a protest, we might also get involved; similarly, if they choose to stay at home, we would do the same. The external reason for subsequent action through decision making and behaviour is the key element connecting the actor within the network. Here, the connection between the actor and the network affects decisions and behaviour. These two components are also mutually exclusive. Motivations that change over time and are caused by others' participation is defined as external motivation, whilst others are necessarily internal motivation. In other words, changes in the internal motivations of others also affect actions through the connections within a network.

Siegel (2009, p. 125) also noted that the combination of these two components produced a simple individual decision rule. Individual (i) participates

at time (t) if and only if $b_i + c_{i,t} > 0$, i.e., when the *individual net motivation* to participate is positive.

In terms of *net external motivation*, a basic assumption is that the more people within one's local social network participate, the more likely one desires to participate oneself. Based on Siegel (2009, p. 125), the local participation rate ($lpr_{i,t}$) of any individual directly connected or any individual within one's social network are the consistent parsimonious factors of net external motivation $c_{i,t} = -(1-lpr_{i,t})$. As external motivation increases, it is more likely that the individual will participate. Siegel's analysis further stated that "under this definition, net external motivations range from −1 to 0 for all time, and their initial values are $c_{i,0} = -(1 - lpr_{i,0})$, where the $lpr_{i,0}$ is the initial local participation rate" (p. 125).

This explains how external motivation promotes the participation of others within one's social network. The local participation rate captures the effectiveness of the external motivation rate, suggesting that the influence of external motivation occurs within one's social network.

The interconnection of the individual in the network is differentiated according to the network structure. Some network types lead to more participation and some lead to less. To understand how this interconnection works in social networks, it is necessary to explore how they influence individuals more deeply. The next section describes in greater detail how independent decisions and external motivation occur in the context of a network; the types of networks and how they function; and which network type may generate more protest.

Social Network Structure

Before discussing in more detail the network structure outlined in the work of Siegel (2009), a brief description is provided of the development of research in this area, which covers various angles that complement each other.

Social network analysis is a study on a social phenomenon that focuses on relationships (Hennig et al., 2012). The connections among individuals and institutions in daily activities comprise friendship ties, authoritative chains of command, financial exchanges, and membership of an association or any specified connection constituted as a social network. A key study examining the social network effect was that of Granovetter (1973), who showed how micro-level interaction affected an aggregate phenomenon. His theory, outlined in *The Strength of Weak Ties*, explains how individuals are influenced by others through weak relationships. These relationships are considered "weak ties" because they are not as stable as "strong ties" (an individual's close relationships with their personal, family or frequent contacts). Although "weak-ties" do not affect an individual's everyday routine, they potentially influence an individual's interpersonal network. Consequently, this acts as a pathway to spreading powerful information throughout society.

The foundation established by Granovetter (1973) has stimulated many other researchers to enhance this field. The question of how information is spread among people has encouraged many studies of social networks to focus on network structures.

Borgatti and Everett (2000), Diani (2011), Frantz, Cataldo, and Carley (2009), Kearns, Suri, and Montfort (2006) and Ravasz and Barabási (2003) have identified and summarised several relevant network structures.

Table 5-1: Types of Networks[60]

Network Type	Scholars
Random Networks	Erdős and Rényi (1959)
Small-World Networks	Watts & Strogatz (1998); Watts (1999)
Core-Periphery	Borgatti and Everett (2000)
Scale-Free Networks	Barabási, Albert and Jeong (1999); Faloutsos, Faloutsos, and Faloutsos (1999)
Hierarchical Networks	Ravasz and Barabási (2003)
Segmented Network	Diani and McAdam (2003b)
Isolated Cliques	Lamertz (2009)

Notes: The table summarises the developments in network studies and the scholars in this field.

[60] Further description in 'Appendix B'

David Siegel (2009) explained network structures and collective action, providing a comprehensive background to understanding the protest phenomenon. His basic dynamic model has been used to explain the interrelationship between actors and their behavioural role in political protest. Based on this work, Siegel (2009) made two crucial assumptions. First, every individual possesses different motivations for participation. The second assumption was that individuals adjust their desires to participate. Siegel (2009) also provided a useful typology of network structures in the context of collective action. His work forms the basis of the theoretical argument used in this study, as discussed further in the following sub-section.

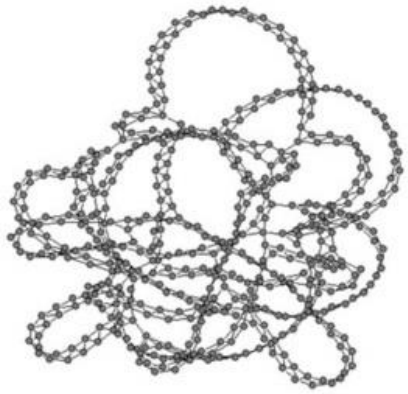
Siegel (2009) addressed four main typologies of network structures: (1) the Small-World Network, (2) the Village Network, (3) the Elite Network, and (4) the Hierarchical Network. This section describes these network types and highlights their resulting protest dynamics.

The Small-World Network

Two crucial characteristics of the Small-World Network, as identified by Watts and Strogatz (1998), are, firstly, highly clustered sub-groups, and secondly, frequent bridging connections among these sup-groups. Siegel (2009) suggested that Small-World Networks correspond to modern dense cities and suburban areas. The Small-World Network structure is commonly observed in cities, where no exceptional citizens hold an excessive amount of influence over their peers. Two random actors are connected by a short chain of actors, despite the size of the network. Each individual has a substantial overlapping network with each of them. Hence, there is an equal chance to influence individuals outside of a cluster.

Siegel (2009) stated that the formation of these series of connections is caused by regimented connections (childhood friendships), which are perturbed as an individual moves to join new groups of friends. The Small-World Network has received attention in social network research (Giustiniano & D'Alise, 2014) because information and resources can travel between any two actors at an intense speed.

Figure 5-1: Small-World Network (Siegel 2009:132)

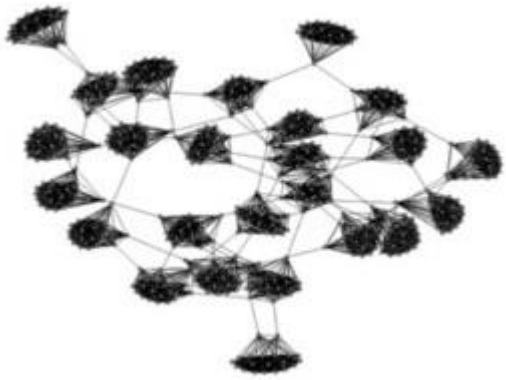


Notes: The figure shows the structure of connections in the network. The dots indicate the actors in the network and the line shows the connections.

The Village Network

The Village Network structure is similar to the Small-World Network but it is tightly grouped and separated. It is meant to resemble small towns, villages, and cliques; in this typography, everyone is associated with high-density subgroups within the social unit and they have an equal chance to influence one another. A few actors form bridges between the groups. Compared to the Small-World Network, information transfer in the Village Network is passed across subgroups by only a few actors.

Figure 5-2: Village Network (Siegel 2009:132)



Notes: The figure shows the structure of connections in the network. The dots indicate the actors in the network and the line shows its connections.

The Opinion Leader/ Elite Network

Opinion Leader Networks, also known as Elite Networks, involve social elites (Siegel, 2009, p.131). This type of network is also called the Core/Periphery structure. It consists of an inner circle whose members are strongly tied to one another and to a secondary aggregate with a few ties (Nelson, 2001). In this type of network, most actors have few connections, while the minority (opinion leaders) have many more connections. The core actors can coordinate, influence, and mobilise the overall secondary aggregate while the secondary aggregate has no such capacities (Lamertz, 2009). The high number of elite connections and motivations among the elite and other core actors will increase participation. This is because the behaviour spreads outwards from the motivated elite to their followers. In this type of network, the degree of elite conformity in motivation is more significant in stimulating participation; however, the core/periphery will perform poorly in mobilising and participating when there is low motivation among the elites (Siegel, 2009, p. 134).

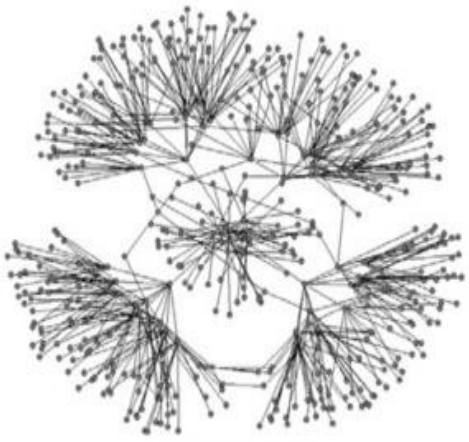
Figure 5-3: Opinion Leader / Elite Network (Siegel 2009:132)

Notes: The figure shows the structure of connections in the network. The dots indicate the actors in the network and the line shows its connections.

The Hierarchical Network

In a hierarchical network, the power of the elite is placed at the top level of the aggregation. It is also characterised by the number of actors as one moves down from the top. Each individual is connected to one actor above and to several actors below. The size of the network is determined by the rate of expansion. For instance, quoting from Siegel (2009, p. 131) "if the expansion rate is 3, one is the actor at the top, the second level is 3, the third level is 9, the fourth level is 27". The strength of this type of network is indicated by the series of levels expanding exponentially in width.

Figure 5-4: Hierarchical Networks (Siegel 2009:132)



Notes: The figure shows the structure of connections in the network. The dots indicate the actors in the network and the line shows its connections.

To understand the influence of structure on mobilisation, one needs to choose a distribution of initial motivation, which is likely to be correlated with the network structure. Siegel assumed that *net internal motivation* (b_i) is distributed randomly in Small-World and Village Networks. In Opinion Leader and Hierarchical Networks, individuals have symmetrical influence because elites can possess internal motivations that are uniformly either high or low. Siegel (2009, p.132) further stated that "the distribution of motivations is as much a part of the network structure as is the arrangement of connections".

The dynamics of the ties and the leader's role in the network cause complex interactions with the network structure and the distribution of motivation across the population.

It is also important to understand a network's strength in terms of how it can mobilise protest. The next section discusses the network's strength and its capability to facilitate mobilisation.

Network Structure and Mobilisation

The likelihood of mobilisation is indirectly related to one's social network (Campbell, 2013). Based on the simulations by Siegel (2009, p.133), the Small-World and Village Networks have particular strengths in relation to mobilisation. Village networks spread motivational behaviour efficiently within the village; however, behaviour spreading between villages is less efficient than within a village. Behaviour spread most likely takes time because village structures are separated into groups. In contrast, spreading motivation in the Small-World Network is highly effective as no group cluster is involved. Motivational behaviour easily disperses throughout the network without moving from one village to another. These two network types have strengths in relation to mobilisation based on their capabilities; however, the village network has limited competency as it is only effective within the village, unlike the Small-World network, which has more advantages in terms of spreading motivational behaviour throughout the network.

Both Opinion Leader and Hierarchical Networks have considerably fewer overlapping actors. These types of networks display weaker encouragement in generating mobilisation and also make it harder to control parallel motivations within the network. In an Opinion Leader Network, when the elites have low motivation, this produces less participation because this network structure relies entirely on a few sources that strongly influence many other individuals. The scenario resembles the Hierarchy Network, in which non-uniformity and a lack of intra-level connectivity result in a poor spreading of motivation.

Meanwhile, Siegel (2009, p.133) also demonstrated the stability of these networks and their sensitivity in responding to different types of repression. He addressed two forms of repression, indiscriminate and targeted. The former means randomly picking out the actors, while the latter means the opposite: more and the most important actors are selected.

Under random removal, a Small-World Network will still obtain a high participation rate. The rate of participation monotonically declines as repression increases. Quick removals will effectively break down network interactions by eliminating early participants before they have a chance to influence others. In a Village Network under targeted removal, even with minimal rates, this will be highly effective in reducing participation. Removing the influential actors in an opinion leader network will effectively depress participation, even at a very low level of repression. Meanwhile, random removal will have a higher tendency to pick non-influential actors who generally do not affect mobilisation significantly. The heart of a Hierarchical Network's effectiveness is the interconnection within the levels of hierarchy, which provides the opportunity for the masses to influence the other level of participation in the network. As the network flows top-down, when repressions increase, this will inhibit or eliminate the passing-down of leaders' messages to their subordinates and leave followers on their own without interconnection. This separation in the network will stop the mobilisation.

It has been shown that the Small-World Network is stronger in delivering mobilisation. Even though the description of the networks is limited by simple pedagogical reasons at the cost of realism, the outline has given a clear configuration specification for comprehending their stability.

Overall, the discussion has covered a number of important points that contribute to the motivation to join a protest. It can be simply formulated that within individual protest decision making (net internal and net external motivation), the type of network also plays a significant role. Both of these factors depend heavily on the effectiveness of the "influence" itself, whereas the key effectiveness of influence is based on the effectiveness of information. No influence will contribute to motivation if the information is ineffective. For

example, the rate of protest information delivered may be slow, no clear information may be given about who is joining protest, or no clear information may be given on the date or time. Hence, an individual will take more time to gather the information needed before they can make a decision. In the worst case, this could demotivate people from going to protest. Ineffective information will not guarantee a positive influence on the motivation to protest.

The role of information exchange is essential in developing political knowledge in a network (McClurg, 2006). Siegel's (2009) model highlights how knowledge spreading through networks, which is based on how behavioural change affects agents' behaviours and those they connect to. Information exchange is important as it influences the participant's decision making by allowing them to understand the costs and benefits involved. As discussed in an earlier section, the component of net external motivation relies solely on information about others in the network, which subsequently inspires one's decision making.

However, the background to the discussion on individual protest decision making and network types has been explained based on the conventional communication approach without considering the impact of ICT. It is important to reflect on current communication technologies as these become more prominent in modern everyday life.

Social interactions connect people and may construct mobilisation through effective information and communication. There is a need to distinguish the effects of a network structure on protest mobilisation by considering current developments in communication. The following sub-section discusses the features of ICT and its potential use in protest mobilisation.

Features of ICT

This sub-section specifically addresses four unique features of ICT and their general consequences. First, ICT has the potential to increase interaction among citizens; second, ICT provides a broad yet anonymous audience; third, ICT

is cost-efficient in bridging connections across geographical and demographical barriers; and fourth, ICT provides a wide range of available sources of information. These features demonstrate how ICT makes information more effective and efficient.

ICT increases interaction among citizens - Information transfer is a crucial activity in maintaining the relevance of a network (McClurg, 2006). Online social networks correspond to interpersonal relationships on dedicated websites or other applications that enable users to communicate with each other. Social media comprises websites and applications that enable users to not only create and share content but also participate in online social networking. This attribute of new communication technology has the potential to increase interaction naturally by creating more bridges among subgroups that transcend geographical barriers. In effect, the individual external factors that stimulate decisions and individual behaviour increase tremendously. A study by Klofstad (2007) revealed that a high level of peer political discussion increased the rate of civic and political participation by 13%. This explains how a person's participation depends on the social network's impact on the degree of agreement, or the support from individual experiences while interacting within their network. Mcclurg (2006, p.738) labelled this as the political composition of a network. For example, if a person has similar political preferences to one's family and friends, one is likely to participate; but if one's family and friends disagree with the other person's political views, one is unlikely to be involved.

ICT provides a broad yet anonymous audience - ICT has given rise to social media platforms, which are important arenas for communication and the exchange of ideas. Social media has become a highly important platform for Internet users seeking any and every type of information as the internet is the most prominent medium of contemporary communication. Furthermore, interaction with a broad, anonymous audience will catalyse the development of the civic skills required to participate in political environments (Quintelier & Vissers, 2007). The dynamics of ICT have important implications for the structure of social networks. For example, various tightly-knit network groups who are not on agreeable terms may resolve their disputes through the existence and aid of

ICT, which helps in building and extending the bridges between them and beyond. This is due to the actors in certain networks who actively and fully use ICT to obtain and gather new information before disseminating it to others. Hence, the existence of opposing political views and disagreements cannot be denied. In addition, ICT has successfully stimulated cross-cutting between networks, which Mutz (2002, p.115) referred to as "social interactions that cross lines of political difference".

ICT is cost-efficient in bridging connections across geographical and demographical barriers - With ICT, the activities of information-sharing occur swiftly and at minimal cost across geographical and demographical boundaries. As a result, the is the potential to modify the current landscape of the network structure. For instance, ICT in the Core/Elite Network gives each actor in the network an equal opportunity of becoming the main actor, who coordinates, influences, and mobilises other actors within and between networks. This occurs as social media promotes network heterogeneity and opinion polarisation in general (J. K. Lee et al., 2014). An actor may receive information from various sources and have the ability to become the source of information to other actors. Within the context of political mobilisation, a diversity of perspectives is provided by social media. With motivation, various individuals work together, leading social media users to a networked space. In such circumstances, activities relating to politics can easily occur (Lee, Choi, Kim, & Kim, 2014). In another example, social media has become a social-environment that provides extensive opinion leaders with far more opportunities to influence the public. For instance, on matters involving profit and loss, the thoughts of opinion leaders are an essential reference for other consumers (Chu & Kim, 2011). This interpersonal communication exchange is highly associated with the effect of social networks and political behaviour (McClurg, 2006).

ICT makes available a wide range of sources of information - ICT interactions involve sharing opinions, discussing, and generating new ideas based on numerous available sources of information from various perspectives. These authorise the audience to make their own decisions and not rely only on a singular source of information. The heterogeneity and opinion polarisation of the

information provided by ICT may challenge the social network structure when actors are at liberty to choose, evaluate, compare across the network, and make their own decisions.

Overall, the discussion suggests that ICT has a significant impact on the networks. It is also important to note that the rate of the impact may vary between individuals as well as types of networks. The following sub-section explains in detail how ICT affects network structures.

How ICT affects the network structure

Engaging in a protest is not a simple and impulsive decision. Deciding to participate in a movement is a complex process (Diani & McAdam, 2003b; Opp, 2009). The previous sections began the discussion on individual protest decisions and added that the effectiveness of information is assisted by the effectiveness of the development of ICT technology as this modifies the network structure and subsequently affects the protest participants. This section addresses the specifications of the theory to be examined empirically. The first part of this section presents the network specification, in which the condition of the network structure is identified from the artificial network that had been created, followed by a discussion of the alterations made by ICT features to social network typologies. Lastly, the hypothesis for the study is proposed.

The decision to participate may begin with interaction. This is closely tied to the structure of networks, which provide certain levels of motivation to participants. The literature provides minimal insights into the network structure. According to McClurg (2006, p. 739), "the effect of a social network on political behaviours depends on how it structures the interpersonal exchange of political information". It is important to determine the specification details of a network structure to understand the effect of ICT on the network.

To do this, the artificial networks characterised by Siegel (2009) were re-created for each network type. The simulation uses 150 dummy actors programmed according to different network types. A new structure was also

created based on the ICT concepts that enable people to connect to everyone. The aim of the fully connected network was to use it as a comparison for reference purposes.

The work of John Tukey was described by Luke (2015). According to the former, to concisely state the crucial/prime characteristics of a univariate distribution for the network requires "the five-number summary". This model simply and quickly performs the above. Some of the related summary measures from Tukey (1977) were adopted; these describe the most important distributional characteristics of networks. Hence, the summary will enable an understanding of the size/magnitude of a network, how densely connected it is, and how clustered the actors are within it. In addition to the network summary, two additional measures were added, mean degree and mean distance, to provide further information on the network characteristics. Table 5-2 illustrates the various networks, based on the types presented earlier. This provides more detailed information about the characteristics of each network.

Table 5-2: Network Specification

	(1) Small-World	*(2)* Village Network	*(3)* Opinion Leader	*(4)* Hierarchical Network	*(5)* Everyone Connected
Network Size (*v*)	150	150	150	150	150
Density	0.026	0.038	0.014	0.0138	1
Diameter	38	8	3	5	1
Transitivity	0.5	0.360	0.0039	0.0167	1
Mean degree	4.013	5.8	2.09	2.06	300
Mean distance	19.127	4.610	2.700	4.315	1

Notes: The rows list the difference measures for the different network structures (shown in the columns).

Density is simply the compactness of the actors in the network. The values range between 0-1, where 1 is the highest and indicates maximal compactness. The same holds for transitivity, which measures connectedness. If everyone is connected to everyone else, then transitivity is equal to 1. Diameter measures the shortest average number of steps from one end of the network to the other. The lower the value, the more efficiently information can travel across the network. Mean degree measures the average of inbound and outbound links a person has in a network. The higher the average, the higher the connectedness among the actors within the network. Mean distance is the average distance between two

individuals in a network. This measure captures how quickly any information can travel across the network. Before the mean distance value becomes 1, in the initial stage of network expansion, a new individual is added to the network, which increases the mean distance value. The value will decrease to a lower value when no newer individual is added to the network. The lower the value, the shorter the distance and the more quickly information can travel across the network.[61]

Without ICT, the information required is usually acquired from interactions within the existing local contact groups. The new developments in communication technology may affect an existing network. It is necessary to consider the features offered by ICT, such as the multiplication of interaction among citizens, the broader anonymous audience, the cost-efficiency across distance, and the provision of a wide range of sources of information. Considering the simulation results, and together with the four ICT features identified in the previous section, it was then possible to envisage how the network structures might be affected by ICT.

In a Small-World Network, the introduction of ICT means a wider interaction between various audiences and sources of information. In these types of networks, the new communication technology will expand the horizon by multiplying the subgroup clusters and creating further connections between them. As previously stated by Siegel (2009), regimented connections (such as childhood friendships and high-school friends) break down as people move (to work or migrate, for instance). With the existence of social media, these types of connections can be sustained more easily.

In a Village Network, the introduction of ICT will enhance the number of actors that act as bridges between groups. For instance, if each person in the network has access to the internet, they have more inter-links, and no longer have to rely on the same actors or those who act as bridges in connecting between villages.

[61] The precise mathematical definition of the measures is provided in Section 5.4.

For elite networks - Opinion Leader Networks and Hierarchical Networks - the introduction of ICT might offer effectual communication when the leader is now able to influence a protest more efficiently among a wider range of followers. Moreover, the instigators might be able to influence a protest from inside their narrow clique because they now have additional connections. It is no longer the case that one opinion leader communicates to everyone; the technology now enables everyone to communicate with everyone else. This means that the Opinion Leader Network could become denser and break down into a more clustered network. In Hierarchical Networks, the powerful elite are at the top level of aggregation, so the introduction of ICT will affect Hierarchical Networks similarly to Opinion Leader Networks. Since the foundation of its effectiveness is interconnection within the level hierarchy, the internet will enhance efficiency and assist the leader to disseminate information while multiplying their influence among new participants in a broader audience provided by new communication technology. The communication flow within the level can become shorter and more compact as ICT breaks down the communication flow boundaries.

The key feature of protest, as mentioned by Siegel (2009, p.133) is that when people are closely knitted and clustered, there is greater potential to produce protest and develop better resistance for the protest as the effects of changes in the network structure depend on the average appetite for protest and the distribution of protesters in a network. ICT particularly affects “ties” within and between the actors. In any type of network, its “ties” can be considered its heart. In Small-World Networks, the number of highly interconnected ties certainly plays a major role in mobilising protest. In Village Networks, ties are essential for providing links between the villages to disseminate and stimulate mobilisation in the network. In Opinion Leader and Hierarchical Networks, ties are significantly used to disseminate information from the elites to the followers. This interconnection is sufficient to encourage followers to disseminate information to influence others. ICT substantially multiplies the volume of interaction, broadens the sources of information at minimal cost, and maintains its high phase. As it is economically affordable, everyone in the network arguably has equal accessibility to ICT.

However, these assumptions are too general as they do not consider various other factors. In some networks, people are expected to experience the impact of the internet immediately after it is introduced; however, in some types of network structures, this may not happen immediately. For example, interaction in a village is likely to be personal. The key challenges in this study were the potential threats of false positives and false negatives. To overcome this, the type of network used was specifically defined as the individual political network, while the comparative approach was also used. These matters are discussed in more detail in the design section.

It is also useful to note that the simulation of the network specification in Table 5-2 removed some other factors, such as time, linguistic, cultural, and religious differences. These factors may become the boundaries that prevent networks from becoming fully integrated. ICT is not only bringing people closer into one dense network but also multiplying the ties and generating new nodes. During this process, it was expected that some measurements, such as mean distance, would increase up to a point and only then return to a smaller value. This would mean the network condition was saturated, whereby there were no more absolute new nodes. The same applies to the density measure as, when ICT provides wider contacts, it will reduce the density value because observed ties in the network continue to expand, reducing the value of proportion.

On the other hand, there was also the potential for alternative situations to occur. For some people, politics is considered a specific yet sensitive topic. As mentioned by Putnam (2000), in common interactions, participants do not explicitly seek political information. People usually try to avoid discomfort in interactions. Second, participants most likely want to maintain social harmony in an interaction. In politically polarised societies, those who disagree will stay quiet to maintain the relationships formed for other reasons (Munson & Resnick, 2011). People may talk about politics when they know the political status of others and they know that others know their political stance.

In summary, this theoretical discussion has referenced the important concepts needed to understand the impact of ICT on individuals during protest.

The discussion began by examining individual protest decisions and highlighting the roles of net internal and net external motivation. The discussion then explained how this motivation and independent decision making occur in the different contexts of network structures. The Small-World Network is arguably the most capable of spreading the motivation to protest. By taking into account the effectiveness of the information dissemination brought by ICT, it was contended that ICT could collectivise all the network structures into one fully connected network and, in turn, influence the individual protest motivation. ICT creates more connections across the whole population due to the low costs of communication, better accessibility, and greater availability. ICT provides advantages to instigators to rapidly influence other actors outside their face-to-face contact system. The internet not only multiplies the rate of interaction but also widens individual connections by rapidly multiplying the number of ties between Village Networks (1) and the multiple interconnections between and within Opinion Leader networks (2), breaking down the communication levels in Hierarchical Networks (3), and reducing the distance betwen actors in Small-World Networks. In consequence, the introduction of ICT gathers all types of networks into one large dense network, in which everybody has an equal chance to connect to anyone and be connected by anyone.

To sum up, it was contended that ICT affects the network structure and the effectiveness of the information influences many people to protest, whereby a modification of the network was expected because of ICT. To identify this effect clearly, it was necessary to focus on a specific network (the individual political network) and use specific measures. For that reason, the focus was on the density, transitivity, and mean distance measures. Positive increases in network density, transitivity, and mean distance were expected in the political network. Given these facts, the following hypothesis was proposed:

H1: As ICT offers everyone the opportunity to connect and be connected, it will considerably affect the political network composition by breaking down the current structure into a connected network for everyone. This will increase the density, mean distance, and transitivity.

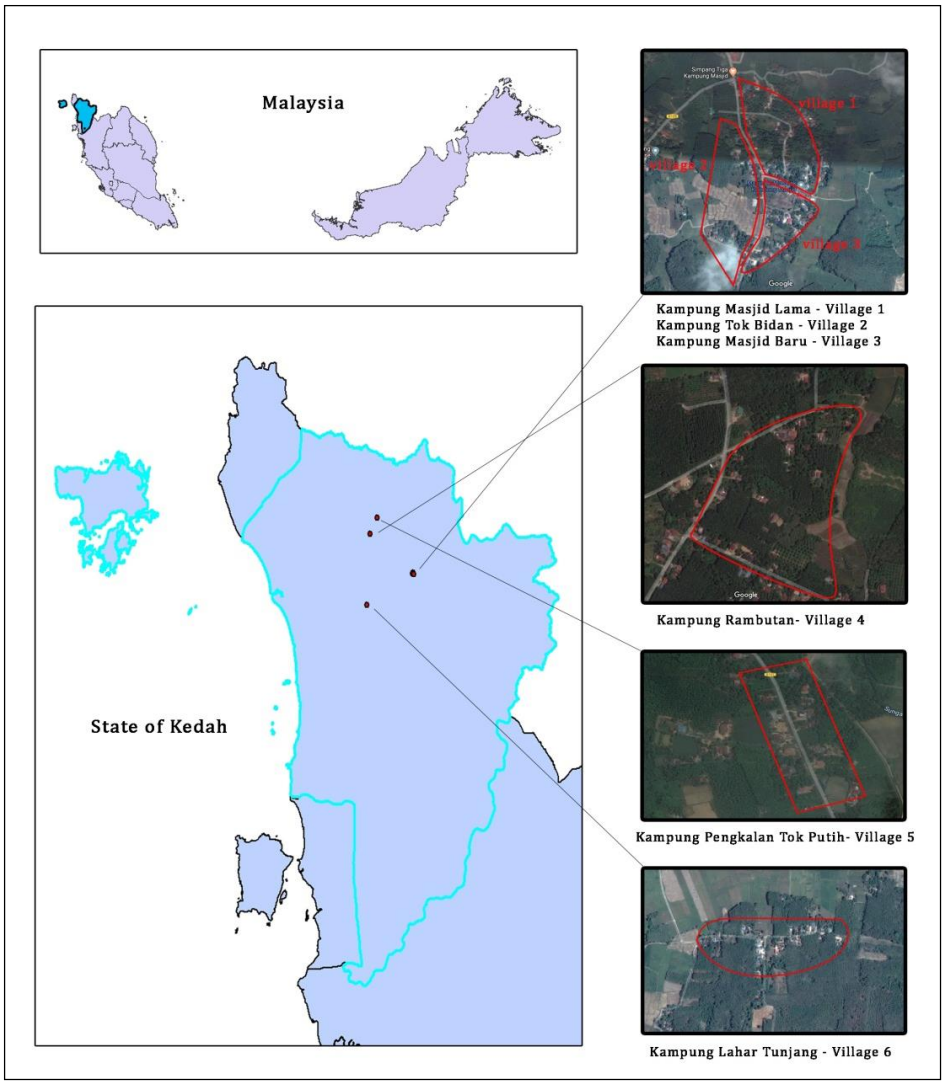
To assess this hypothesis, the following section discusses the design and measurement of the study.

5.4 Design and Measurement

To investigate the effect of ICT on political networks, a comparative design was used. The purpose of this design was to determine whether the independent variable (ICT) affected the outcome (network structures), by comparing changes in network structure among otherwise similar villages in rural Malaysia. The sample selection was the same as that mentioned in the previous chapter (Chapter 4). The same approach was also used, the two-wave survey, in three matched village pairs before and after the internet became available in one village within each matched pair. To ensure the theoretical assumption was precisely examined, two types of network information were devised, the political network and the non-political network. These are explained in detail later in this section.

Figure 5-5 shows details of the sample areas, which were villages in Naka district. Naka is a district 36 kilometres outside Alor Star, a city in the northern state of Kedah, Malaysia. All six villages were matched in terms of socio-economic background, as explained in the previous chapter.

Figure 5-5: Villages Location



Notes: The figure shows the locations of the selected villages. On the right of the figure, the red line shows the village areas selected as samples in the study.

There was a 6% attrition rate between wave 1 and wave 2. However, the change in the sample size might have had a mechanical effect on the structure of the network. To minimise any mechanical effect on the result, the analysis was limited to the people in the base- and end-lines. By holding the sample size constant, all the other effects would be due exclusively to temporal changes. To test the key prediction of the theory, it was vital to acquire non-political network information to compare and identify the real effect of ICT on protest. The survey questionnaires included questions on interpersonal communication, which aimed to capture each respondent's network. The questions were divided into two separate sets of contacts, firstly, political contacts and secondly, non-political contacts (the placebo).

When collecting two networks for comparison, the networks should be as conceptually distinct as possible (Larson & Lewis, 2016). There is a clear difference between political and non-political networks. These two types of networks will not experience the same structural impact from ICT for several reasons. First, non-political interaction is relatively specific and does not affect the wider public. For example, interactions on family matters, office affairs, personal finances, or any other subjects that do not affect a wide range of citizens are unlikely to be affected by ICT in the same way as the interactions people have on political matters. Secondly, non-political interactions usually do not depend on popularity, which reduces the effect of ICT availability on such networks.

A financial subject was chosen for non-political contacts, which certainly involved a null effect of ICT. Most of the internet features discussed earlier relate to the power of influence. The financial subject is a different dimension, unaffected by the introduction of the internet. This made the financial network the best placebo. The same network questionnaire was used for the baseline and follow-up surveys to collect information on the respondents' social network data and interactions across all villages at two points in time.

Table 5-3: Excerpt from the Questions

Items	Questions	Remarks
1	*Over the past seven days, whom have you interacted with concerning political/public issues?*	*Politics-related contact*
2	*Can you name and indicate brief information about five individuals whom you interacted with over the past seven days concerning political/ public issues?*	*Politics-related contact*
3	*Can you list (name) five individuals that you have referred to regarding your personal finances?*	*Finance-related contact*
4	*Pick the category that best describes the above-named individual's relationship towards you.*	*Scale*
5	*On a scale of 1 to 5, where 1 means not close at all, 2 means somewhat close, 3 means moderately close, 4 means very close and 5 means extremely close, how close a relationship do you have with the five named individuals?*	*Scale*

Notes: The table shows an excerpt from the questions asked to the respondents. The same questions were used during the first and second rounds of data collection.

Table 5-3 shows a selection of the questions asked to the respondents during data collection. For this survey, the free recall design was used (Hennig et al., 2012), whereby each respondent was asked to list their contact names. There are different approaches to determining the number of contacts. Not limiting the

number of contacts allowed the respondents to list as many contacts as they could recall, which also provided a true picture of the breadth of their network (Borgatti et al., 2013). However, this rarely happens when people vary with regard to recalling names. It might be easy to recall many names in a dense population but for a less-dense population, it would be difficult (Larson & Lewis, 2016). Thus, the best way to address this situation was to limit the number of contacts people could provide (Borgatti et al., 2013; Larson & Lewis, 2016). During the survey interview, the respondents were asked to name up to five people (maximum) with whom they discussed or talked about politics and also to name up to five people (maximum) to whom they referred concerning their financial matters.

Comparing changes across the different types of network enabled the general temporal effects to be distinguished from the specific ICT effects. Besides, obtaining contacts from outside the main subject also permitted a comparison between the structures of the two different networks (Larson & Lewis, 2016).

All the contact information was compiled and analysed using a social network analysis approach. To perform the analysis, the data was organised and analysed using R software. The following sub-section defines the measurements used and the steps subsequently taken to examine the impact of ICT on network structures.

Density

Of all the social network summary measures, density is the most important. Density is defined as the proportion of observed ties (edge). It exists in a network with a maximum number of ties. In other words, density, as a ratio, has a range of 0 to 1. The network is considered more interconnected when the density value is closer to 1. Two different formulae can measure density, based on whether the network ties are directed or undirected. In a directed network, k*(k-1) is considered the maximum value of possible ties among K actors. A directed network density is defined as:

$$\frac{L}{k*(k-1)}$$

where L is the number of observed ties in the network, divided by the number of possible ties. In an undirected network, K*(k-1)/2 is considered the maximum value of ties. These ties are calculated only once per node pair. A network's undirected density is thus defined as:

$$\frac{2L}{k*(k-1)}$$

In this study, it was assumed that both non-political and political contacts were undirected, which meant the interaction was reciprocal.

Transitivity

The presence of clustering is a fundamental feature of a social network. The extent of clustering can be measured by examining the transitivity in the network. The work of Luke (2015) on transitivity encompasses the proportion of closed triangles among a set of open and closed triangles (p.16). His term for a closed triangle was a 'triad', in which three ties are observed. Meanwhile, his explanation of open and closed triangles referred to triads, in which either two or all three ties were observed (p.16). He further stated that transitivity is a ratio ranging between 0 and 1. The clustering of a network is greater when the value is closer to 1.

Mean Distance

The properties of a network can also be examined by assessing the direct connections between actors. This enables an understanding of how people are embedded in complex networks. Based on the work of Hanneman and Riddle (2005), to understand the position of the individual within a network, it is necessary to "calculate the distance of an actor from others" (p.102). The authors also stated: "If two actors are adjacent, the distance between them is one" (that is, it takes one step for a signal to go from the source to the receiver) (p.102). If A

tells B, and B tells C (and A does not tell C), then actors A and C are at a distance of two. “The mean distance among actors in a network is important for the macro-characteristic of the network as a whole” (p.102). Generally, when the distance is far, information takes time to spread throughout the population (Hanneman & Riddle, 2005, p.103). For this measure, in a large *N* network, it was expected that the value of mean distance would increase first and only return to the smaller value when the network is saturated.

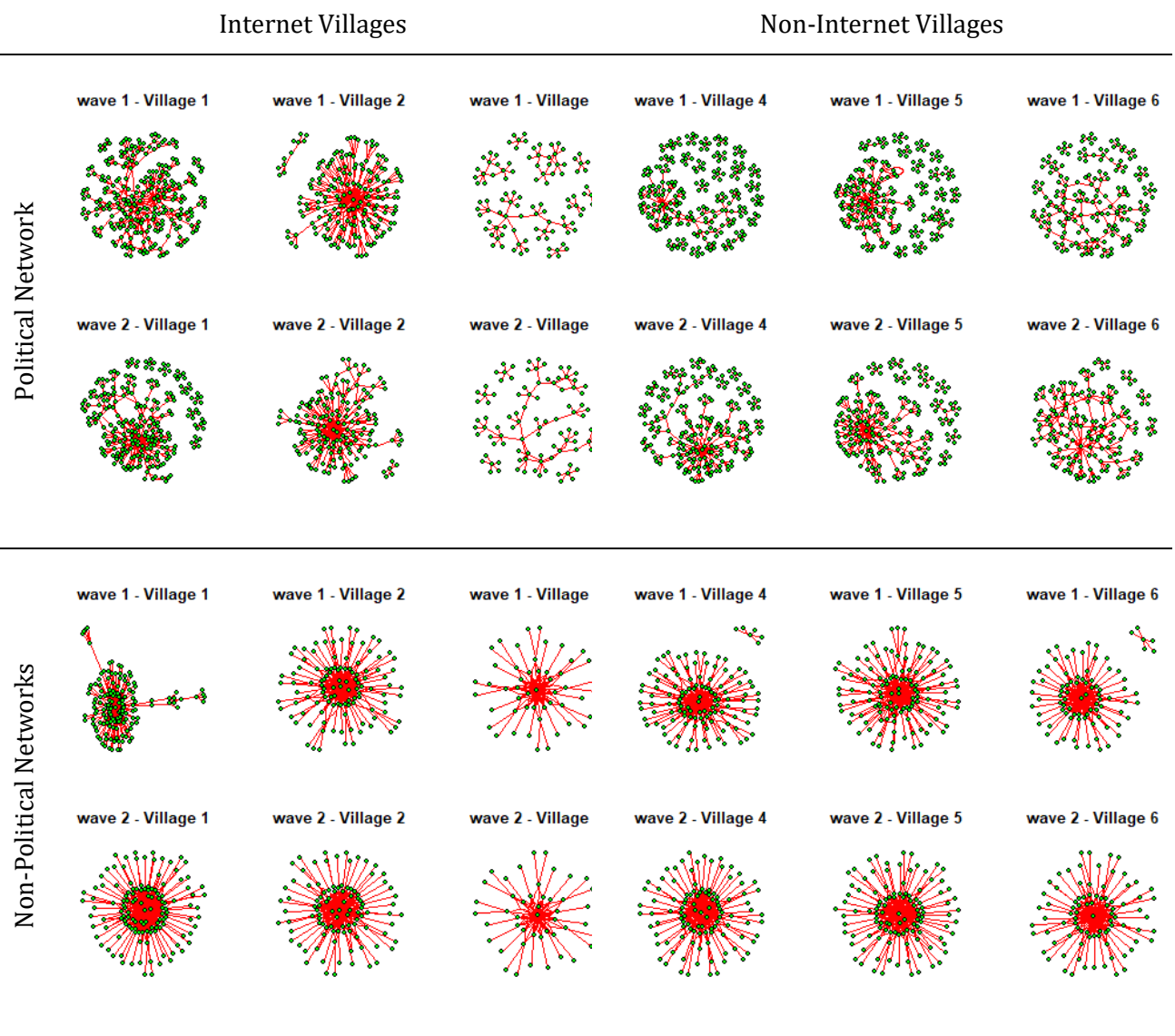
Data management and procedure

The questionnaire was comprised of open-ended questions designed to collect information on individuals within a respondent’s network. This was done entirely through face-to-face interviews. The data was then entered into a spreadsheet in a sparse matrix format before it was transposed into an edge-list format. The edge-list format condenses the listing of each row corresponding to a single tie, which goes from the node in the first column to the node listed in the second column. The edge-list format is far more efficient at handling large networks (Luke, 2015). Within R, the *Statnet* and *iGraph* packages were used to test the study hypothesis.

5.5 Analysis

To test the hypothesis, the social network data was analysed by comparing the social networks in the six villages across two points in time. It was hypothesised that exposure to the internet would modify the current political network structure into a fully connected network. ICT allows everyone to become more connected and get connected by others. Hence, it was expected that the density, transitivity, and mean distance values would increase after experiencing the internet. This section is divided into three parts.

Figure 5-6: Network Structure

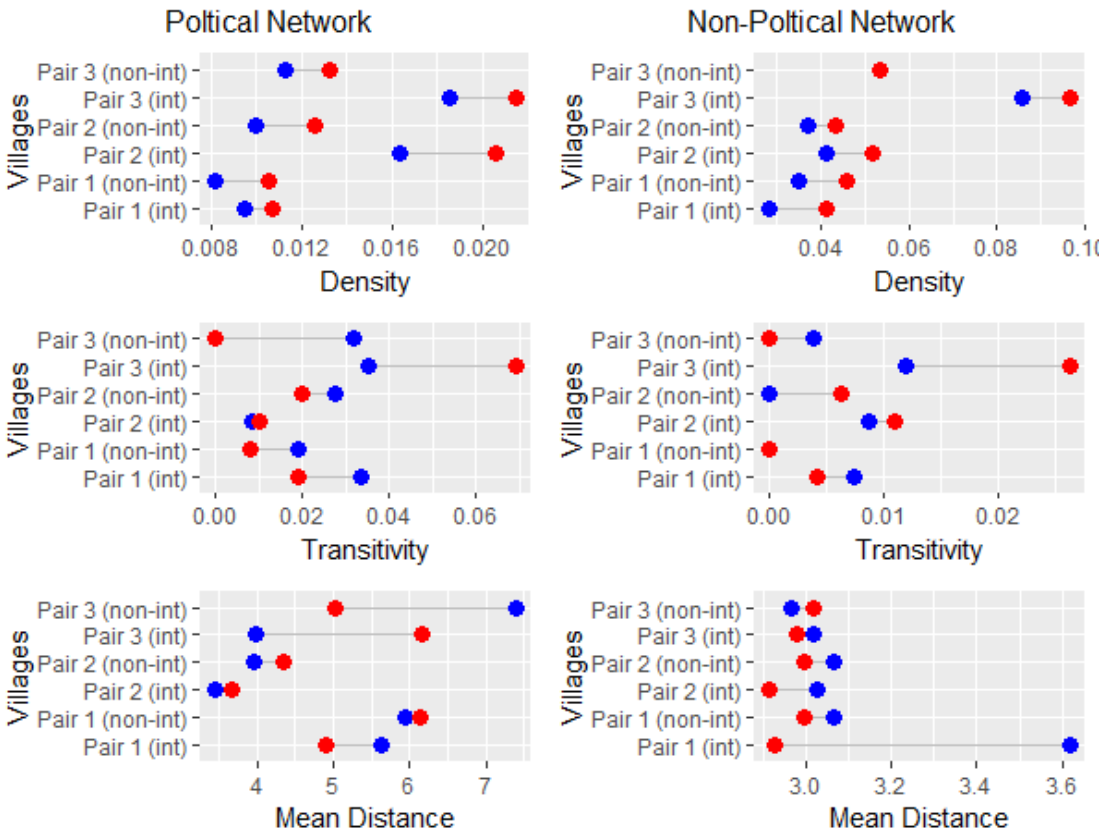


Notes: The figure shows the results of the network structures from the sample collected. The images are arranged in parallel to show the differences between the first and second waves.

This step began by comparing the network structures by visualising the network typography before and after the treatment (Figure 5-6). The author then proceeded with the network analysis and finally performed a difference-in-differences analysis. The latter analysis utilised data from the three matched village pairs. Then, a baseline model was estimated and compared with the follow-up, based on each estimated factor (density, transitivity, and mean distance). This approach was important in examining the effect of ICT on network structure as it helped to prevent any alternative explanation for the effects on the network.

Figure 5-6 presents the comparison between the political and non-political network structures across the two points in time for those villages receiving and those remaining without an internet connection. This figure illustrates that the political networks adopted the form of a Village Network, as characterised by Siegel (2009, 2011). In comparison, the non-political networks more closely resembled an Opinion Leader network. The political networks in the internet villages revealed clear changes in connections over time. Individuals became more connected when the internet was introduced. From the visualisations, the political network structure revealed structural changes after the introduction of the internet. The results for the non-political networks show that ICT minimally affected the network structure modification. To illustrate more clearly the effect of the internet on network structure, the villages were arranged into their pairs.[62]

Figure 5-7: Network Comparison



Notes: The figures compare the estimation results for the three difference measures between the first and second waves. On the right are shown the results for the political network, while the left side shows the results for the non-political network. The blue points indicate the results for the first wave; the red points indicate the results for the second wave.

[62] Detail result can be found in Appendix "D"

Figure 5-7 displays the results from three measures: density, transitivity and mean distance. In total, there were six villages; villages 1, 2, and 3 had the internet but villages 4, 5, and 6 did not. Matched villages are listed next to each other: pair 1= village 1(internet) with village 4 (non-internet), pair 2 = village 2 (internet) with village 5 (non-internet), and pair 3 = village 3 (internet) with village 6 (non-internet). The blue points represent the results at the starting point in November, while the red points represent the results from March.

For the density measure, the overall changes in the political networks for the internet villages were slightly higher than those with no internet, with average values of 0.0028 (internet villages) and 0.0023 (non-internet villages).

All the political networks in the internet villages revealed an increase in density. Internet village 2 had the highest increase of 0.0043, from 0.0163 to 0.0206. This was followed by internet village 3, which changed by 0.003 from 0.018 to 0.021. Internet village 1 also showed an incremental increase of 0.0012, from 0.0094 to 0.010.

The political network density values in the non-internet villages increased almost identically. Village 4 changed by 0.0024, from 0.0081 to 0.010; village 5 changed by 0.0025, from 0.0100 to 0.0125; and village 6 changed by 0.002, from 0.011 to 0.013. The non-political network density changes were also positive, but they were smaller than most of the changes among the political networks.

Indirectly, the density analysis results indicate that as ICT broadens the space to communicate, the dispersion of interconnection slows the growth of the density level. Initially, it was predicted that ICT might increase the density value as everyone has an equal opportunity to connect and to get connected. However, people's use of ICT in the real world allows a huge spacing in the social network. People are connected not only within a population but also to outside the population, causing the density value to increase more slowly.

In terms of the political network transitivity, the average change from all the internet villages was 0.007. The values for villages 2 and 3 increased respectively by 0.0016, from 0.0084 to 0.010; and by 0.0341, from 0.035 to 0.069.

However, the transitivity of internet village 1 decreased by -0.0147, from 0.033 to 0.019. The average transitivity change for all the political networks of the non-internet villages was -0.01687. For the non-internet villages (4, 5 & 6), a consistent reduction in transitivity was observed.

The transitivity results from the non-political networks produced mixed results. Internet village 3 showed a significant increase from 0.0120 to 0.0263. Internet village 2 slightly increased from 0.0087 to 0.011. Conversely, internet village 1 showed a fall from 0.0073 to 0.00414.

For the non-political networks in the non-internet villages, village 4 showed no change between wave 1 and wave 2. Village 5 increased from 0 to 0.0063, while village 6 decreased from 0.0039 to 0.

On aggregate, the transitivity measure results suggest that ICT had a positive effect on modifying a political network. ICT increased the clusters in the network by completing the ties between a three-person clique in the network. Transitivity measures the cluster frequency, so the addition of any node in which the three-person clique was completed would be counted. An expansion of the network with, for example, a new node from a different population, would technically not affect the measure as long as the node completed the three-person tie.

For mean distance, the average change from all the internet villages in terms of the political network was 0.5557. The political network results from internet villages 3 and 2 increased the average path among the actors respectively, from 3.986 to 6.158, and from 3.458 to 3.679. However, internet village 1 produced a difference as the result decreased from 5.639 to 4.911.

Meanwhile, the average change from all the non-internet villages was -0.5970. In non-internet village 6, the average distance decreased from 7.394 to 5.023. The other two non-internet sites, villages 4 and 3, showed slightly increased average distances among the actors in the networks of 0.1965 and 0.3861.

In terms of non-political networks, the average changes for the internet villages decreased by about -0.2822. Internet village 1 decreased by -0.6933, from 3.619 to 2.925. Internet villages 2 and 3 also showed a decrease in mean distance values, from 3.025 to 2.913 and from 3.019 to 2.977, respectively.

For the non-internet villages, only village 6 showed a slight increase, from 2.963 to 3.016. For the other non-political contacts in the non-internet sites, villages 4 and 5 showed lower mean distance values, from 3.064 to 2.994 and from 3.063 to 2.993, respectively.

The mean distance results indicate that people were most likely to interact on political issues with new people outside their population. These findings partly reflect McClurg's (2006) view that "this is a healthy effect of democratic practices" (p.748). He also added that the exposure incentive can widen the collection of information and the viewpoints held by the public. This effect encourages the public to understand certain issues and thus generate new knowledge (McClurg, 2006). In general, the political networks in the treated villages increased over time in terms of ties, compared to those villages' non-political networks. ICT appeared not to affect the financial network as its metrics remained unchanged among the treated villages.

On average, the results from the social network analysis were shown to support hypothesis 1. To confirm this, the effect of ICT on network structures was further investigated by performing a difference-in-differences analysis. The purpose was to estimate the size of the treatment effect by controlling for a general time trend across the villages.

The results above yielded a panel dataset with 12 observations, which was too small for any meaningful statistical analysis. Knowing that only villages 1, 2 and 3 received the internet enabled the treatment and control groups to be defined. This difference-in-differences estimate captured the changes in outcome for the treatment group (internet villages) by calculating the changes in outcome for the control group (non-internet villages). The effects of the treatments were estimated from the differences between the treatment and control groups, which were kept constant over time.

There are several ways to run a difference-in-differences analysis. One common technique is to use simple regression. As the sample was small and the aim of this analysis was relatively straightforward, a matrix table technique following Gertler et al. (2011, p.98) was used to perform this analysis. For each measure, each value was taken for two different periods, before and after the internet. Then, the values for the treated and control villages were compared. In the difference-in-differences analysis, it was important to consider that the differences in outcome would need to move in tandem between the treated and control groups. In other words, the outcomes should decrease or increase at the same rate in both groups, even those without treatment.

Table 5-4 reports the difference-in-differences estimates for the political networks of all three village pairs.[63] The left column indicates the estimated measures, column 1 indicates before the treatment, column 2 indicates after the treatment, and column 3 indicates the difference between the two. Panel A reports the density measure result, Panel B reports the transitivity results and Panel C to reports the mean distance results.

Overall, the political network density results were relatively tiny. The average effect of ICT on political networks was positive, indicating that the Internet had the impact of merging the networks into one dense network. The results were also positive for the non-political networks, with an average of 0.0057.

The results for measured transitivity before and after the treatment yielded a negative result for Pair 1 for the political network, and for Pair 1 and Pair 2 for non-political contacts. The average treatment effect on political contacts was positive, with an average of 0.0236. This suggests that ICT increased the average node's ratio of the triangle in the network (the three-person clique). In other words, ICT enhanced network activity by connecting ties among the actors. For non-political contacts, the average transitivity value was very tiny, 0.004.

[63] The non-political network and overall result DID can be found in the appendix. See Appendix 'B' and 'C'

Table 5-4: Difference-in-Differences Estimates of Political Network

Panel A : Density		*(1)*	*(2)*	*(3)*
		after	*before*	*Difference*
pair 1	Treated (village 1)	0.01068	0.00947	0.00121
	Untreated (village 4)	0.01058	0.00819	0.00239
	Difference	0.0001	0.00128	DD1 = -0.00118
pair 2	Treated (village 2)	0.02055	0.0163	0.00425
	Untreated (village 4)	0.01255	0.01	0.00255
	Difference	0.008	0.0063	DD2 = 0.0017
pair 3	Treated (village 3)	0.02147	0.0185	0.00297
	Untreated (village 6)	0.01326	0.0113	0.00196
	Difference	0.00821	0.0072	DD3 = 0.00101
	Overall difference density= DD1 + DD2+ DD3/3			0.00051
Panel B : Transitivity		*(1)*	*(2)*	*(3)*
pair 1	Treated (village 1)	0.019	0.0337	-0.0147
	Untreated (village 4)	0.008	0.0189	-0.0109
	Difference	0.011	0.0148	DD1 =-0.0038
pair 2	Treated (village 2)	0.01	0.0084	0.0016
	Untreated (village 4)	0.02	0.027	-0.007
	Difference	-0.01	-0.0186	DD2 = 0.0086
pair 3	Treated (village 3)	0.0692	0.0351	0.0341
	Untreated (village 6)	0	0.032	-0.032
	Difference	0.0692	0.0031	DD3 =0.0661
	Overall difference transitivity = DD1 + DD2+ DD3/3			0.024
Panel C : Mean Distance		*(1)*	*(2)*	*(3)*
pair 1	Treated (village 1)	4.9119	5.639	-0.7271
	Untreated (village 4)	6.1405	5.944	0.1965
	Difference	-1.2286	-0.305	DD1 =-0.9236
pair 2	Treated (village 2)	3.6796	3.458	0.2216
	Untreated (village 4)	4.3512	3.965	0.3862
	Difference	-0.6716	-0.507	DD2 = -0.1646
pair 3	Treated (village 3)	6.1588	3.986	2.1728
	Untreated (village 6)	5.0203	7.394	-2.3737
	Difference	1.1385	-3.408	DD3 =4.5465
	Overall difference mean distance = DD1 + DD2+ DD3/3			1.152

Notes: The table presents the estimation results of the difference-in-differences analysis for the political networks. Panel A presents the density measure results, Panel B presents the transitivity results, and Panel C presents the mean distance result. In each panel, there are three pairs of villages: pair 1 = village 1 (internet/treated) and village 4 (non-internet/untreated), pair 2 = village 2 (internet/treated) and village 5 (non-internet /untreated), pair 3 = village 3 (internet/treated) and village 6 (non-internet/untreated). The first column shows the results after treatment, the second column shows the results before treatment, and the third column shows the difference between the two. *DD* is the result of the difference between the treated and untreated groups, both before and after the treatment.

The mean distance average difference-in-differences estimate yielded a positive result for political contacts and a negative result for non-political contacts. As expected, the mean distance value positively increased for the political contacts but not for the non-political network. Even the assumption seemed inconsistent with the simulation results given in Table 5-2, which suggest that when people were all connected, this minimised the mean distance. The simulation was run over a fixed number of 150 samples. It did not consider various other factors such as time or background demographic differences such as race, religion, and culture. As ICT enhances human connections, it actually increases the number of new nodes and keeps the network expanding until saturation; only then would the mean distance value decrease. The question on saturation timing was omitted, and this could form part of a future investigation.

Overall, the results reported above tentatively support the argument. The results offer more insights into the effect of the internet on a network structure. The evidence suggests that ICT has an impact on a political network structure.

5.6 Conclusion

This paper explored the impact of ICT on the political social network structure. It presented a novel argument for the way ICT affects political networks and assessed this using an innovative exploratory approach.

In general, most social network debates revolve around understanding social processes in an offline environment (De Rycker, Fong, Ponnan, Sankar, & Ean, 2015; Moliterno & Mahony, 2011; Sharif, Djauhari, & Djauhari, 2012; Song & Eveland, 2015; Ward, Stovel, & Sacks, 2011). In this study, the main argument addressed how the political structure changes with the development of new communication technology. This provides an alternative explanation of the ways ICT might be related to protest.

ICT allows everyone to get connected with anyone; hence, every individual will be affected, especially in terms of their political networks. The features of ICT

will multiply the political network composition by breaking down the current structure into one dense network.

This assumption was tentatively assessed using a novel dataset gathered through a two-wave network survey in six villages in rural Malaysia. This fine-grained social network information enabled an empirical assessment of the impact of ICT on political networks. The analysis suggested that ICT augments an individual's political network, which is connected by direct ties into numerous types of political nodes.

Some speculative observations can be drawn from the results. For example, in this scenario, ICT would be unproblematic for an authoritarian regime when the country is growing. For instance, maintaining efficient governance, improving employment opportunities, and eliminating poverty will give people positive perceptions of the government. However, when issues or crises (such as corruption) affect governance, ICT could trigger a highly problematic situation that would be far harder to control as people would be connected. The possible conditional effect of society's "appetite" for protest could not be ruled out. This condition might effectively facilitate protest if it was triggered together with sensitive issues (Fergusson & Molina, 2019), especially in relation to an economic downturn (Manacorda & Tesei, 2019). Furthermore, ICT would effectively accelerate the mobilisation effort (Weidmann & Rød, 2019b). Protest in times of crisis would be more likely once ICT has been introduced as an increased appetite for protest translates more easily into a protest with denser networks.

However, this study did not measure network resistance to repression, nor predict the number of protests. This study examined specifically the impact of ICT on protest participation, as generated from individual political networks. This exploratory study offers new insights into the effect of ICT on political networks. Admittedly, many other questions complicate a full comprehension of the impact of ICT on protest. The evidence from this study also suggests that change in a social network structure is a dynamic process.

It is also important to note that this is an innovative study that may have several deficiencies. One of these is the period of study. A three-month gap is

insufficient time to fully identify the impact of ICT on a social network. The results were also drawn from a small sample dataset. Due to resource and time constraints, it was only possible to collect three matched villages for this study. Hence, the evidence provided above should be considered indicative rather than definitive.

Future research should be conducted more rigorously, allowing for a longer treatment period and using a larger sample of matched villages to test the network effects of ICT. This will offer a more accurate interpretation of the population. Future research might also include outside contacts without being limited to the context of villages. It is also suggested that the data should be evaluated from a different perspective, such as an ego-net analysis. Overall, the evidence for this type of study remains at the preliminary stage and requires more extensive examination.

5.7 Appendix

A: Location Details

Table 5-5: Towers On-Air Information

	New Location / Tower Name	Area Covered	State	First Permit Payment	Go-live Date
1	*Kg Ulu, Tunggang Kanan (jalan ke Durian Burung)*	*Village 1*	*Kedah*	*14/10/2017*	*14/11/2017*
2	*Kg Bidan, Mukim Tekai*	*Village 2*	*Kedah*	*05/10/2017*	*05/11/2017*
3	*Kg Lubuk Rambai*	*Village 3*	*Kedah*	*24/10/2017*	*24/11/2017*
4	*Kg Tandop (mukim Tekai)*	*Village 1*	*Kedah*	*24/10/2017*	*24/11/2017*

Note: New tower locations, Kuala Nerang District, Kedah. Information provided by Kuala Nerang & Pedu District Office

B: Network Development Research

The random network was developed by Erdös and Rényi (1959) and is a structure that emerges from random interactions. Watts (1999), as well as Watts and Strogatz (1998), defined highly clustered groups with low average distance, in comparison to random networks, as Small-World Networks. Borgatti and Everett (2000) defined the Core-Periphery as a group of actors with a large number of connections, both among themselves and with actors on the periphery. The latter are weakly connected to the other group of actors on the periphery and to the nodes at the centre. The Free-scale Network, developed by Barabási et al. (1999) and Faloutsos et al. (1999), was characterised by the few hubs with which an actor has many connections and by the majority of the nodes being connected with few links to other powerful actors. Ravasz and Barabási (2003) described how the Hierarchical Network is the consequence of a hierarchical organisation, implying that a small group of nodes are organised in a hierarchal manner into an increasingly large group. The Segmented Network was described by Diani and McAdam (2003b) as groups of a network that decentralise from the main network; later, Lamertz (2009) discussed the distribution of multiple identity meanings in organisations, finding an isolated clique network, which consists of groups of decentralised and isolated cliques. They had also fragmented from the main network.

C: Difference-in-Differences – Non-Political Networks

Table 5-6: DID Table of Non-Political Networks

Panel A: Density			
pair 1	*after*	*before*	*Dif*
Treated	0.01068	0.00947	0.00121
Untreated	0.01058	0.00819	0.00239
Dif	-0.0001	0.00128	-0.00118
pair 2	*after*	*before*	*dif*
Treated	0.02055	0.0163	0.00425
Untreated	0.01255	0.01	0.00255
Dif	0.008	0.0063	0.0017
pair 3	*after*	*before*	*dif*
Treated	0.02147	0.0185	0.00297
Untreated	0.01326	0.0113	0.00196
Dif	0.00821	0.0072	0.00101
Panel B: Transitivity			
pair 1	*after*	*before*	*dif*
treated	0.019	0.0337	-0.0147
untreated	0.008	0.0189	-0.0109
dif	0.011	0.0148	-0.0038
pair 2	*after*	*before*	*dif*
treated	0.01	0.0084	0.0016
untreated	0.02	0.027	-0.007
dif	-0.01	-0.0186	0.0086
pair 3	*after*	*before*	*dif*
treated	0.0692	0.0351	0.0341
untreated	0	0.032	-0.032
dif	0.0692	0.0031	0.0661
Panel C: Mean Distance			
pair 1	*after*	*before*	*dif*
treated	4.9119	5.639	-0.7271
untreated	6.1405	5.944	0.1965
dif	-1.2286	-0.305	-0.9236
pair 2	*after*	*before*	*dif*
treated	3.6796	3.458	0.2216
untreated	4.3512	3.965	0.3862
dif	-0.6716	-0.507	-0.1646
pair 3	*after*	*before*	*dif*
treated	6.1588	3.986	2.1728
untreated	5.0203	7.394	-2.3737
Dif	1.1385	-3.408	4.5465

Notes: This table presents the estimated difference-in-differences results. Panel A presents the density measure results, Panel B presents the transitivity results, and Panel C presents the mean distance results. In each panel, there are three pairs of villages: pair 1 = village 1(internet/treated) and village 4 (non-internet/untreated), pair 2 = village 2 (internet/treated) and village 5 (non-internet /untreated), and pair 3 = village 3 (internet/treated) and village 6 (non-internet/untreated).

D: Overall Difference-in-Differences

Table 5-7: DID Overall Difference

Group	*Density*	*Transitivity*	*Mean Distance*
Panel A: Political Contacts			
Pair 1	-0.001	-0.004	-0.924
Pair 2	0.002	0.009	-0.165
Pair 3	0.001	0.066	4.547
Average	0.001	0.024	1.153
Panel B: Non-Political Contacts			
Pair 1	0.002	-0.003	-0.623
Pair 2	0.004	-0.004	-0.041
Pair 3	0.011	0.018	-0.095
Average	0.006	0.004	-0.253

Note: This table presents the estimated overall difference-in-differences results. Panel A presents the Political Contact results, while Panel B presents the Non-Political Contact results. In each panel, there are three pairs of villages: pair 1 = village 1(internet/treated) and village 4 (non-internet/untreated), pair 2 = village 2 (internet/treated) and village 5 (non-internet /untreated), and pair 3 = village 3 (internet/treated) and village 6 (non-internet/untreated).

E: Network Analysis– (n= 564)

Table 5-8: Political Contacts

Political Contact	Village 1		Village 2		Village 3		Village 4		Village 5		Village 6	
	Round 1	*Round 2*	*Round 1*	*Round 2*	*Round 1*	*Round 2*	*Round 1*	*Round 2*	*Round 1*	*Round 2*	*Round 1*	*Round 2*
Density	0.00947	0.01068	0.0163	0.02055	0.0185	0.02147	0.00819	0.01058	0.0100	0.01255	0.0113	0.0133
Transitivity	0.0337	0.019	0.00840	0.01	0.0351	0.0692	0.0189	0.0080	0.0277	0.020	0.032	0
Mean distance	5.639	4.9119	3.458	3.6796	3.986	6.1588	5.944	6.1405	3.9651	4.3512	7.394	5.0203
Non-Internet village							X		X		X	

Note: The table presents the detailed estimation results for every village in Round 1 and Round 2.

Table 5-9: Non-Political Contacts

Non-Political Contact	Village 1		Village 2		Village 3		Village 4		Village 5		Village 6	
	Round 1	*Round 2*	*Round 1*	*Round 2*	*Round 1*	*Round 2*	*Round 1*	*Round 2*	*Round 1*	*Round 2*	*Round 1*	*Round 2*
Density	0.0283	0.041244	0.04102	0.05151	0.0857	0.0966	0.0351	0.04582	0.0370	0.0433	0.0533	0.0534
Transitivity	0.007367	0.00414	0.00874	0.0110	0.0120	0.0263	0	0	0	0.0063	0.00392	0
Mean distance	3.619	2.92563	3.025	2.9137	3.019	2.977	3.064	2.994	3.063	2.9931	2.963	3.0164
Non-Internet village							X		X		X	

Note: The table presents the detailed estimations results for every village in Round 1 and Round 2.

Chapter 6

CONCLUSION

6.1 Summary of the Studies

This concluding chapter summarises the findings of this study, highlights its contribution, as well as describing the shortcoming and avenues for future research. In general, this research aimed to determine how ICT development has affected extra-institutional activities, specifically protest. To achieve this goal, the topic was investigated using three different designs. First, ICT development in general was examined. The second element was the experimental design approach to assess the mechanism effect and, lastly, the innovative approach was used to evaluate the social network structure.

This study began by examining the impact of ICT on the general growth of the internet. Many studies have argued that extra-institutional activities are strongly related to collective action problems without taking into account the role of communication. As the key element in the overall protest phenomenon is communication, the existing theory has been enhanced by specifically examining the coordination problem, from which the hypothesis was derived. The existing research has also investigated the global scale, in which the different effects of 3G and GSM were not distinguished. The author contends that the growth of the internet increases the number of protests as the internet overcomes collective action problems and facilitates coordination. The evidence from the analyses suggests a lack of substantial proof showing that ICT has a significant relationship with protest. Moreover, no clear differential effect was found between the GSM and 3G networks. This study contributes as an empirical work by distinguishing different ICT technologies in a within-country comparative design. This study also focused on the local scale, using the district as the unit of analysis since this is more precise than an artificial grid. The analysis was obtained from the fine-grained

data, which allowed any alternative explanations to be rejected. Hence the empirical contribution to this specific setting.

In the next part of the study, a survey experiment was conducted to measure the effect of exposure to different forms of information on protest. The next step was to explore how the coordination link mattered in a protest setting. The coordination link is always assumed and debated in the literature; however, it has not been tested rigorously. This second study drew on the role of ICT in protest onset in the context of coordination games. The experiment was run using the coordination mechanism underlying the liberation thesis. The growing internet coverage in Malaysia allowed the collection of novel data. The survey experiment was finely designed and employed with six identical villages in rural Malaysia, only three of which would experience the internet. This permitted the survey experiment to precisely assess the impact of the internet on protest behaviour. The results indicate the absence of a clear effect of technological development on protest activities. These findings provided little evidence to support the common claim that ICT development has a positive impact on political unrest. This study offers empirical contributions as it provides a new understanding of how ICT affects the coordination mechanism. The comprehensive investigation using field experiments in a naturalistic environment made the empirical evidence worthwhile.

The study continued with an investigation of the social network structure. The results from the previous two studies did not correspond with the existing literature. The coordination mechanism did not seem to hold, at least not in the context of Malaysia. Thus, the evidence suggests that ICT is not the prominent factor that gets people out into the street. However, it is impossible to rule out studies arguing that ICT has a major effect on protest, but this may occur not via coordination but more indirectly and subtly via a change to the political network. The social network structure model by Siegel (2009) was used as the stepping stone to comprehending the phenomenon. The study involved the collection and analysis of an original exploratory longitudinal network survey over six villages, before and after they experienced the internet. The empirical evidence from this preliminary study suggests that ICT transformed the political network structure

into one dense network, which has unfolded a new dimension through which to understand this under-researched relationship. This study makes a theoretical contribution by highlighting an alternative way in which ICT might affect protest. ICT is not a direct cause of protest, but it functions as a mediating factor by changing the structure of social networks and thereby making protest mobilisation more effective, should it occur. This model has surpassed those in the existing social movement literature as the author treated the role of ICT/the internet as an exogenous factor rather than as a tool, as it has been treated in the current literature.

Overall, this research demonstrates that proficiency in communication and the reception of information alone do not cause the public to go out to protest. ICT affects the individual structural changes in the political network that were the catalyst for extra-institutional action.

6.2 Limitations and Implications

Although these studies have determined the relevant effects of ICT on protest, the results are subject to certain limitations. In particular, this study focused only on a single context, which limited its generalisability. As the protest database from the police records was only developed for Malaysia, it offers little explanatory range. Different results might have been obtained in different contexts representing additional socio-economic levels or in diverse regions, at least elsewhere in south-east Asia. It would be useful to compare these regions.

Another shortcoming of the police database is that it relies solely on one source: protest events that had been recorded in the police record system. There is a possibility that protest events happened but were not reported or recorded. It is not advisable to use this database to examine specific cases. For example, if a protest report case was being investigated as a crime, it would be impossible to disclose and share such information specifically as this may interfere with the police investigation. Apart from not being freely available to the public, the

database is somewhat problematic in terms of being updated regularly as it involves a long bureaucratic process.

Chapters 4 and 5 emphasise the preoccupation with the effects of ICT on political behaviour but the study focuses exclusively on six villages in rural Malaysia. The original database used was also limited. The village samples were not taken randomly across Malaysia. All the participants were from the same socio-economic background, which did not necessarily represent the Malaysian population as a whole. These limitations to the sample could hinder the external validity of the study. Therefore, it was also subject to biases and potential confounding that may have influenced the estimated result.

Another limitation of this study is the focus on protest onset. Other aspects of protest are not explored, such as protest mobilisation, protest duration, message propagation, and recruitment. The theoretical discussion did not reference repression in great detail, although this is important to comprehend, especially for a hybrid-regime country like Malaysia. It is strongly suggested that these aspects are discussed in future studies.

Additionally, this study is related to the uncertainty surrounding the conclusions drawn from the analyses. In Chapter 3, the decision was restricted to a single context, complicating any claim to generalisability. The same issues apply to Chapter 4, where the conclusion was drawn from a limited sample and analysis. In Chapter 5, the conclusion was drawn from the same sample size as in Chapter 4, whereby the innovative approach was applied to measure the network structure changes. Since an innovative approach was adopted, it was prone to uncertain conclusions.

Although there are some limitations in this research, the findings hold several important implications for future practice. Despite the potentially important role of the internet - serving as a cost-efficient tool for mobilising, coordinating, facilitating information and debate, documenting, and distributing protest materials - no clear evidence was found that it facilitated protest, at least in the case of Malaysia. Hence, traditional factors, such as the offline effect, should still be considered in future studies, as stated by Gerbaudo (2012). Despite the

practicality of communication technology in assisting political communication, it is not a complete substitute for offline communication. It is also important to not discount the influence of mainstream media as this may also influence early protest formation.

The author's theoretical argument and empirical analysis also show that ICT has a positive effect on individual networks. The penetration of the internet into political networks may be greater than its effect on social-economic networks. This opens broad questions on how and to what extent citizens (especially those who are not active politically) receive and process political information about protest activism in an online environment.

In general, ICT development has improved local communication. It also benefits many other sectors and services, such as mass media, transportation, and banking. However, this inevitably offers the people new opportunities and presents new challenges to the authorities to set and define the limits of "freedom", "privacy", and many other concepts that might initiate political contention. Many online matters affect peoples' sensitivity, which is very hard to control. Internet policies and regulations should protect the people from its negativity but at the same time not restrict their rights.

6.3 Avenues for Future Research

The full effect of communication development on extra-institutional activity remains unclear. More research in this field is needed to discover how the availability and improvement of ICT among citizens can benefit democratic practice. While this research offers some significant insights, it also leaves many questions in need of further investigation.

Future researchers should investigate protest onset using a larger sample size and in a different context with good protest and ICT coverage data. It is also important to gain information across various ethnicities, which will offer interesting ways to explore how heterogeneous ethnicities respond to the constructs. Moreover, many historical protests have been predominantly

conducted by just one race. This trend has recently changed, with protesters now more balanced in racial composition. Until now, no rigorous empirical studies have been conducted specifically on this matter in Malaysia. The author collected and developed new protest data specifically for the Malaysian context based on the police record. The current version of the database covers protest events from 2007 until 2017 and contains more than 200 protest events over a ten-year period. This fine-grained database could open new avenues for future research, especially to comprehend protest events in Malaysia. This study represents the first step in using the database, but not all the features in the analysis have been fully explored. Several features in this database would be very useful for future researchers to explore.

Secondly, future researchers are highly recommended to examine different dimensions of protest, such as mobilisation, repression, and duration. Some studies also show that online sentiments serve as a leading indicator of individual actions. Sentiments from online political messages are highly likely to influence individual action, especially in risky activities such as protests. Some communication scholars have highlighted that online negative sentiments have more influential power compared to positive sentiments (Yamamoto & Kushin, 2014). In principle, if many negative sentiments concerning a protest, the number of participants will increase. In future research, apart from using a comprehensive empirical strategy, sentiment analysis could be employed by focusing on online interaction.

Third, an inter-country comparative study should be conducted, particularly in developing countries in South East Asia where ICT is still in progress. A comparative examination of the inter-country effect of ICT would be highly beneficial as it would provide an understanding the effect of ICT on protest in different social contexts.

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