North Korea's Dual Network of Mobile Telecommunications Systems and the Futures of the Korean Peninsula

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This paper provides a history of North Korea's telecommunications system which was first introduced in 2002 and analyses the emergence of a dual network system: the official network fully controlled by the Government, and the unofficial network which was begun for business communications by Chinese residents in North Korea and now is used by the populace to avoid Government control. Based on this study, what can be claimed is that the unofficial network of telecommunication in the DPRK could cause a regime shift in a few decades by transforming itself into a defector network working against the regime. From this viewpoint, various futures for the Korean peninsula may be forecasted. Considering the change of the political environment surrounding the Korean peninsula and the technical development of telecommunications, it is possible to anticipate a critical point, which could happen in next decade, when North Korea would be unable to control its people's access to the outside world because of the use of the unofficial telecommunication devices as a portable mass data storage system. This paper will propose some suggestions as to how these changes in communication will affect North Korea's politics, culture and economy.

Key words: North Korea, Telecommunication Systems, Mobile Device, Data Storage Device, Dual network**.**

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Introduction

From 11 million subscribers in 1990, the number of mobile communication subscribers is expected to reach 6.8 billion which is almost same as the world's population in 2013.[1] The growth of mobile telecommunications has led to the transition of how people network each other from an analog-based network through a 'copper line' to a digital-based system to a 'bit.' There are two different prognostications on the effect of the development of a digital network. Nicholas Negroponte, co-founder of the MIT Media Laboratory, said that information transferred through a bit can offer the free exchange of information and, by extension, change the structure of a society by changing the people's way of life and thinking.[2] On the other hand, Evgeny Morozov pointed out that politicians tend to have optimistic views on the technology derived from the internet. He also said that new media technology is not a tool which encourages democracy and freedom in a society, but rather it is the means for strengthening authoritarian government.[3]

The Jasmine Revolution which swept over the Middle East in 2010 triggered world-wide research on the effect of information and communications technology (ICT) on the weakening of authoritarianism and the diffusion of democracy. However, it is now necessary to study the effect of ICT on North Korea, one of the most closed societies in the world, because it has been barely influenced by the political/economic power of the exchange of information through the bit. We shall focus our discussion of North Korea's ICT on its mobile telecommunications in order to create some scenarios about the future conditions of North Korea and the Korean peninsula, potential changes in ICT and their influence on North Korean society.

Technological Determinism vs. Social Construction of Technology

The Jasmine Revolution brought high expectations that the diffusion of ICT in North Korea might result in its transition from a closed society to a more open and democratic one. With the third-generation transmission of power to Kim Jong Un completed in 2012, North Korea has opened up towards information technology (IT). Despite the surveillance and control of its people, North Korea does permit them to make international calls in major cities. Consequently, it is expected that North Korea will be exposed to a radical change through ICT.

There are two different views on the prospect of changes. One is an optimistic view that the exposure of North Koreans to foreign culture through the new IT environment could lead to a civic revolution or to a gradual opening-up of the society with a greater desire to reform the social system. This standpoint is related to the perspective of technological determinism. The other point of view is the prudent view that North Korea will allow IT to be diffused in the

country, but - if political threats exceed economic benefits, the authorities would block the communication network. In this view, it is too hasty to relate the diffusion of IT to the democratisation of North Korea. Rather, the distinct characteristics of IT in North Korea need to be taken into consideration when making scenarios about the future. This viewpoint is related to the concept of the Social Construction of Technology (SCOT).

Our study adapts a point of view different from either of the standpoints mentioned above. Actor Network Theory (ANT), developed by Bruno Latour, we feel is the best way to understand the current system of IT in North Korea. We chose this theory because - by seeing all the objects in the system as a heterogeneous network made by the combination of the actions of various actors, one can develop different scenarios about how the IT environment in 2032 could transform North Korea.[4]

Actor Network Theory and the Dual Network of Mobile Phones

In ANT theory, society is a big network. In the network, there are many key agencies acting in the system, some of which are not human, such as objects and technologies. To explain this, Bruno Latour adapts the concept of the non-human actor who can be seen as an actor who is symmetrical to a human actor. According to this concept, technology as an actor can have activeness, and the activeness of technology can affect human activity and, by extension, change it. In ANT, society is a collective mixture of the human and the non-human.[5]

ANT starts from the question of why some people have more power and others have not enough, even though two people may have an inherently similar physical condition. This theory does not ask what people with more power can do, but focusses on why they can have such power, and why some people cannot have such power. The answer to these questions comes from the concept of the non-human actor. Physical and biological differences between humans are imperceptible. However, in this theory it is important to understand the differences derived from how powerful people relate themselves to non-human actors which exist outside of the human. Thus, people who can mobilize more of the power of the non-human are able to obtain a greater degree of power.

In ANT, the network is a connection between the human and non-human actors. The important point in the process of establishing an actor network is the obligatory passage point (OPP). The OPP is the point through which a certain person or organisation must pass in order to achieve their goals. The actor who succeeds in creating an OPP can gradually attain power when people pass through his OPP. Most OPPs hide their internal processes and reveal only inputs and outputs so that people become alienated by using the OPP. Therefore, to solve this problem of alienation, the actor who has the information about how technology works as an OPP should not monopolise it. On the contrary, information should be open to the public.[6] This is the main point of ANT and our study focusses on this aspect.

Dissemination of IT in North Korea

North Korea, unlike South Korea which possesses the world's leading IT infrastructure, has a low number of households with access to a computer, and a rather small number of users of the internet, intranet and mobile communications. In the early 1990s, North Korea set up a policy to control internet usage when the internet was brought into service for the

Government.[7] The North Korean authorities block the free circulation of information by setting a high user fee, obstructing general public usage.

The mobile telephone was first introduced into North Korea in November, 2002. The first commercialised mobile service in North Korea used the GSM system (Groupe Spécial Mobile) which was established as the European standard by the European Telecommunications Standards Institute (ETSI). First becoming available in the exclusive industrial zone of Najin-Sŏnbong (now called Nasŏn), only key figures in the party, the security department of the military, the police, the secret police and high-ranking officials could use it. The general population began to use mobile phones from December, 2008. 'Koryolink' (75 per cent owned by Egypt's Orascom Telecom and 25 per cent by the state-run Korea Post and Telecommunications Corporation) opened the Wideband Code Division Multiple Access 3G network, and currently has a monopoly on the mobile communication service of North Korea. Orascom said that the number of mobile phone subscribers started from a base of 91,000 subscribers at the end of the year 2009, had 430,000 subscribers by the end of 2010, had increased by September, 2011 to 809,000 subscribers, and had reached one million subscribers by January, 2012. Although the number of subscribers has increased steeply, the service is still only available to 20 per cent of the North Korean population.[8]

A significant sign of North Korea's change was when North Korea announced an investment guide on 26 September, 2012. International communication centres will be placed in P'yŏngyang and Nasŏn. In those centres, international calls and emails can be made to any country, meaning that North Korea effectively has lifted its ban on international calls. Although the number of mobile phone subscribers has risen, the contents and record of every call in North Korea is monitored by the authorities.[9] However, supplementary features of mobile phones, such as the playing of music or the watching of videos, have gained popularity amongst the general population. According to inside sources in North Korea, the number of young people who store South Korean music and films in their mobile phone for listening and watching is increasing. This phenomenon has been spread by the wind of the '(South) Korean Wave' or *Hallyu* of the media culture. However, if listeners are caught, their phones are confiscated by the authorities.[10]

Official Network of Mobile Phones

Even though the North Korean authorities recognise the danger of the wide dissemination of the mobile phone, they nevertheless encourage people to use them, because the expanding telecommunication industry can be an important means of earning foreign currency. Chinese traders visiting North Korea regularly say that the Ministry of Communications sells mobile phones for around three hundred American dollars even though the Ministry bought them in China for eighty American dollars. In addition to a net profit of around two hundred and twenty dollars per phone, a registration fee of one hundred forty dollars is added to the selling price of these phones.[11]

Considering that there were one million subscribers of mobile phones by February 2012, the North Korea Government appears to have earned around three hundred million American dollars except for the profit of Orascom. This fixed income is important for Kim Jong Un to achieve his goal of making North Korea a prosperous country.[12] However, the North Korean Government needs an actor who is free to connect with the outside world and has a

cooperative attitude toward their regime. Orascom meets these conditions and became an OPP for the official network of mobile phones in North Korea.[13]

Unofficial Network of Mobile Phones

North Korea underwent a serious economic crisis from 1994 to 1997, a period referred to as the 'Arduous March'. During this period, the central government's food rationing system collapsed; many people who could not get food rations died of hunger. At that time, Chinese living in North Korea began to emerge as actors who could let North Koreans earn their living by border trade and smuggling. As a result, a network was set up with many North Koreans, enabling people to earn their livelihood in a situation where the Government was unable to maintain rationing.

ANT gives a more detailed explanation to the functioning of this situation. North Koreans who want to earn a livelihood by trading with Chinese in China must be connected to Chinese in North Korea who then become an intermediary or OPP. Chinese in North Korea have kept their position as an OPP by using their unique ability to freely meet North Koreans, and Chinese in both China and North Korea. There is a close relationship between the development of a trade market and the unofficial network of mobile phones since the unofficial network is a necessary tool for both North Koreans and Chinese in North Korea to exchange information. As a result, the Chinese in North Korea have extended their position to being core actors in the unofficial network of mobile phones.

Chinese mobile phones and their networks were important 'non-human agencies' which enabled Chinese in North Korea to create a network with North Koreans. As China's economy rapidly developed in the 1990s, the mobile network system became established throughout the whole country including the border area near North Korea.[14] Many Chinese in North Korea gave their Chinese mobile phones to North Korean traders and shared useful information with them. For example, during the period of the 'Arduous March', unofficial farmers' markets appeared spontaneously. Through this process, the unofficial network of mobile phones in North Korea expanded. The unofficial network of mobile phones, from the early 2000s, changed into one which threatened the North Korea Government by enabling North Koreans to make contact with people in South Korea for the purpose of exchanging information.[15]

Consequently, in North Korea there is a dual mobile phone network, an official and an unofficial network, which coexist together, but are in conflict with each other. The reason why those two competing networks can coexist is that they share the common purpose of surviving difficult situations and circumstances. The official network has been used by the authorities for survival during the period of the nation's financial difficulties, and the unofficial network has been used by individuals to survive financial difficulties in their personal lives. To survive these difficulties through using the official and unofficial network of mobile telephones, foreign currency must be attained effectively from the OPPs, which are Orascom for the official network, and Chinese residents in North Korea for the unofficial network. As North Koreans accumulate wealth, they also become key actors in the official network of mobile phones by buying the mobile phones offered by the North Korea Government.

However, the official network and the unofficial network of mobile phones cannot coexist in the long term. To maintain the Government's system, the official network of mobile phones must block the unofficial network since the unofficial network of mobile phones enables North Koreans to break away from the Government by connecting them with people in China as well as in South Korea. In the short term, these competing networks of mobile phone will coexist as long as foreign currencies are effectively circulated in those systems. In the long term there is a probability that these networks could evolve into more capital-friendly and market-friendly systems because the only way to sustain each network is by the circulation of foreign currencies.

North Korea's Mobile Telecommunication Forecast

Although it is difficult to forecast what kind of IT devices and services will appear in the next twenty years in North Korea, it is possible to say what level of specification and performance IT devices will have by applying an evolutionary pattern of core technologies which have held the central place in the North Korean IT industry over the past decades. IT devices (which day-by-day are getting smaller, cheaper, and with higher performance) are now making cracks in the Government's ability to control the nation through the spread of unofficial mobile phones which can make international calls and to use DVDs which contain foreign contents. Therefore, for a forecast of the IT environment of 2032, it is important to analyse the potential for the transformation of North Korea.

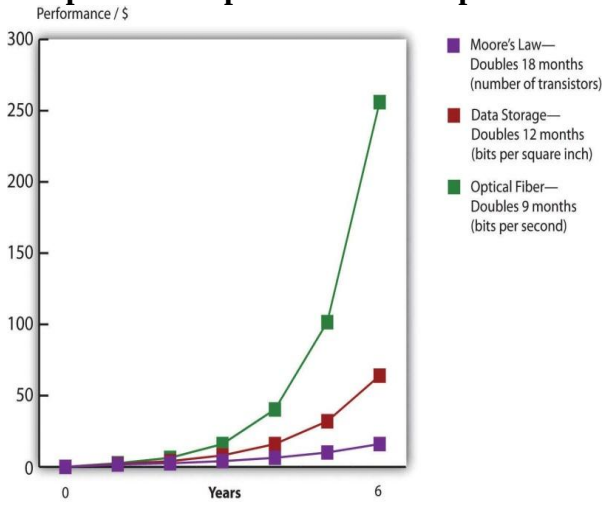
Evolution of Key Technology: Driving Force of the IT Industry

Moore's law, according to the experiential pattern of the IT industry, states that the number of transistors in an integrated circuit (IC) doubles every 18 months. Experts anticipate that silicon micro-machining will reach the physical limit for chips by the year 2020. However, the development of a technical breakthrough such as a one-atom transistor is also expected to occur by the same time.[16]

In the fields of electronics other than the integrated circuit, Moore's law has not been applied. The capacity of data storage doubles every 12 months and the communications bandwidth of optical fiber communications doubles every 9 months. The trend of doubling bandwidth is expected to continue until the year 2030. The overall trend of revolutionary technological development enables people to use cheaper, smaller electronics with a higher performance, at a cheaper price and with a faster communication service year by year. In 2010, Google announced that they would setup a test-bed for the optical fiber-based 1Gbps service, which is one hundred times faster than present AT&T and other communications services. In addition, in twenty years, a 100Gbps service will be possible for a company which installed the right kind of fiber technology.

The UK telecommunications regulator Ofcom commissioned a report on the future of fibre from the firm Analysys Mason. In the report, Ofcom said that between the years 2025 and 2030, shared fiber technology would be able to offer 10Gpbs to each user. Furthermore, individual fibers would be able to offer 100Gbps regardless of whether the internet service providers offered it or not.[17] The speed of the 4G LTE service of South Korea now has reached 50Mbps. Through the dissemination of the 4G LTE service, developed countries by 2020 and developing countries by 2030 will have general access to 1 to 1.5Gbps service from

Figure 1.1 Comparison of speed of IT development



Source: Shareholder Presentation by Jeff Bezos, Amazon.com, 2006.

their major cities. With the rapid dissemination of mobile broadband, mobile telecommunication will become the core of communication systems in 2030. It is expected that by 2030, 60 per cent of the world's population will use mobile broadband, not fixed broadband.[18]

Considering the development of mobile communications, it also is important to track the change in the field of data storage. It is expected that portable data storage devices will change extraordinarily in the next twenty years. In 2012, the basic specification of a storage unit on a personal computer is its hard drive which can store 1 terabyte, equal to 1024 gigabytes. Mobile devices such as iPhone5 have 16 gigabyte memory as a basic option. According to Seagate Vice President Mark Re, hard disks will be able to store 100 to 200 terabytes of information for $150 by 2020 and, by 2030, storage capacity will reach 1 petabytes which is equal to 1024 terabytes[19].

Figure 1.2. Data storage device forecast

	2020 Forecast	**2030 Forecast**
Hard disk drive (internal)	100 to 200 terabyte for $150	1 petabyte (1024 terabyte)
Portable media capacity	1 terabyte	100 terabyte

Source: http://computersight.com.

100 terabytes of information equals at least 10,000 hours of high definition (HD) media which is more than a year's HD broadcasting (8,874 hours). In other words, people would be able to store as much information as they would need for a year in their palm. If free access to the internet can be guaranteed, people can get more storage space with less payment through the use of the cloud service. In addition, as the internet comes into the era of big data, the quantitative growth of data storage will be followed by the qualitative growth of contents such as the creation of petabyte-sized data.

Advancing Transition of Telecommunication Systems

In North Korea, the number of subscribers of mobile phones reached eight out of every hundred people less than four years from the beginning of the mobile service. Considering the pace of the dissemination of mobile service in China, it is expected that the number of subscribers in North Korea will reach ten million in 2022.

Table 1.1 Mobile phone subscribers in China

	2000→(10 years)→2010	
The number of subscribers out of every hundred / millions	6.72 / 85	67.04 / 859

Source: International Telecommunication Union (ITU) 2011.

Table 1.2 Expected mobile phone subscribers in North Korea

	2012→(10 years)→2022	
The number of subscribers out of every hundred / millions (population)	4.10 / 1 (2434)	41.0 / 10 (2500)

Source: World Urbanization Prospects, the 2011 Revision, Department of Economic and Social Affairs of the United Nations (DESA) & Orascom business report 2011 for three quarters[20]

Regarding mobile devices, at least half of them will be a smartphone which can store and play media and apps. At the same time, for the amusement of people, contents players such as iPad and X-box will come into wide use. However, considering the history of the North Korea Government's control over its people, usage of telecommunications devices are likely to be kept under surveillance. Therefore, among the two key drivers of the IT industry, it would be more useful for us to focus on the dissemination of data storage devices including mobile phones.

Unlike the telecommunication system, data storage functions in devices are difficult to control. When the number of subscribers exceeds ten million in 2020, the dissemination of uncontrollable information through data storage devices which are mainly on mobile phones will be hard to control. With rapidly increased information, the society of North Korea could have enough potential power to be transformed regardless of the will of either the Government or the general public. In this case, it is necessary for actors (who might be the North Korean Government, the general public, or the South Korean Government) to forecast plausible and challenging scenarios in order to prepare for the future. Through the process of having various scenarios in mind, it might be possible for them to create their own preferred futures.

Korean Peninsula 2032 Scenarios: Aspirational Futures and Four Generic Futures

The Institute for Alternative Futures has developed the concept of 'aspirational futures' as a means to consider what the future might be. The concept envisions futures in terms of three different zones.

1) The ‘Zone of Conventional Expectation’ which reflects the ‘best estimate’ or ‘best guess’ scenario based on the best available intelligence, informed by environmental scans as well as any fundamental assumptions used by the organisation.[21]

2) The ‘Zone of Growing Desperation’ which asks the oft-avoided question, ‘what could go wrong?’ Scenarios in this zone emerge from a list of major challenges that would be relevant to the organisation.[22]

3) The ‘Zone of High Aspiration’ which describes a future where a critical mass of stakeholders successfully pursues visionary strategies leading to a surprisingly successful outcome. Scenarios in this zone can become powerful motivators for organisational change.[23]

The approach taken by the Institute for Alternative Futures is closely related to the University of Hawai’i Manoa School’s four generic futures scenarios, created by Prof. James Dator and developed by researchers at the Hawaii Research Center for Futures Studies.[24] The ‘Four Generic Futures’ approach describes futures in four different zones.
1) ‘Continued Growth’ is the ‘official’ view of the future of all modern governments, educational systems, and organisations. The purpose of government, education, and all aspects of life in the present and recent past is to build a vibrant economy, and to develop the people, institutions, and technologies to keep the economy growing and changing forever.[25]

2) ‘Collapse’ can come from one or another cause (or combination of causes) and can lead either to extinction or to a ‘lower’ stage of development than currently exists.[26]

3) ‘Discipline’ or a ‘Disciplined Society’ arises when people feel that ‘continued economic growth’ is either undesirable or unsustainable. Some people feel that precious places, processes, and values are threatened or destroyed by allowing continuous economic growth. They wish to preserve or restore the places, processes, or values that they feel are far more important to humans than the endless acquisition of new things and/or the kind of labour and the use of time which is required to produce and acquire them.[27]

4) ‘Transformation’ or the ‘Transformational Society’ focusses on the powerful transforming power of technology – especially robotics and artificial intelligence, genetic engineering, nanotechnology, teleportation, space settlement, and the emergence of a ‘dream society’ as the successor to the ‘information society’.[28]

Our study uses a combination of approaches of the Institute for Alternative Futures and Hawai’i Research Center for Future Studies concepts of ‘zone’ in developing scenarios for North Korea by establishing four scenarios for the future which also includes a visionary outcome.[29]

Figure 1.3 Scenarios for North Korea and East Asia in 2032

		North Korean Control	
		Continuation	Mitigation
Outside Situation	*Chinese economy fails to keep growing. *Political tension and authoritarian control.	Scenario 1. Retarded Control Society.	Scenario 2. Failed Control Society.
	*Cooperation of East Asian countries. *Energy, environment problems in control.	Scenario 3. Ubiquitous Control Society.	Scenario 4. Quasi-democratic Society.

The four scenarios for the future of North Korea are based on two premises:
1) that the evolution of information communication technology will proceed apace for the next twenty years, and that
2) there will be neither a war on the Korean peninsula, nor will the North Korean regime collapse.

The scenario map is composed of two variables. The first variable (across the top of the figure) is the extent of the North Korean regime's ability to control its people and the technology which they will use. The second variable (down the left-hand side of the figure) is the regional situation of East Asia. Developments in neighbouring countries, especially continued stable growth in China, will mainly affect the control strategy of the North Korean Government.

Scenario 1. North Korea as a 'Retarded Control Society'
In this scenario, the Chinese economy, the growth model for the North Korean regime, declines abruptly from the late 2010s. World economic recession promotes social conflicts, riots, and the withdrawal of foreign capital from China. The Chinese Communist Party which is in a state of political crisis strengthens its social control through biometric technology which proves not to be effective. Energy and environmental problems impede the restitution of the world economy. In 2023, the Chinese and Japanese navies clash in the South China Sea. The resolution to this conflict is negotiated between China and the US, but it seriously damages the democratic growth of China. The power gap between the US and China is still evident.

North Korea, which has made some progress in an open economic policy during the early days of the Kim Jong Un regime, meets the structural limits of growth because of the worsened economic environment. Economic cooperation with South Korea is interrupted by the inconsistent policy of the North Korean regime, which proclaims a retro-style Juche economy, not dependent upon foreign markets, because it is said to be better than the capitalistic economy in protecting the basic life of people. The regime still controls the people tightly.

The people commonly enjoy South Korean contents through portable devices, and envy the prosperity of the southern economy. The state-controlled IT service is quite popular, though the network of users cannot openly offer resistance to the regime which still controls their basic life. Although the North Korean regime fails to eliminate either the unofficial TC network or the flow of southern digital contents completely, these do not form a serious threat to the rule of the middle-aged Kim Jong Un.

Scenario 2. North Korea as a 'Failed Control Society'
Political chaos in the Chinese Government encourages conflict within the North Korean élite. Kim Jong Un fails to manage this conflict and is removed by young military leaders in 2024. However, the newly established leadership is not effective in fulfilling the needs of the people who have been demonstrating for a better life. The North Korean regime is close to the edge of collapse, though it manages to negotiate with South Korea for economic support to avoid an uncertain future.

The strict control of the Workers' Party is drastically reduced, but the authoritarian political system does not change into a democratic one as the people wish. People are able to communicate with the outside world through the unofficial telecommunication network, which is actually cheaper, and safer than the officially allowed and filtered international phones of the state-owned telecommunications agency. People freely enjoy *Hallyu* contents, and create their own social network where any kind of critical opinion is allowed. In result of this change, South Korea becomes a major partner for economic development, and call centres for South Korean companies open in P'yŏngyang.

Scenario 3. North Korea as a 'Ubiquitous Control Society'
The Chinese economy keeps on growing, and catches up with the US economy by 2032. The Chinese Communist Party peacefully adopts a democratic path by holding multi-party, democratic elections without also losing its power to control the nation. The success of China in both economics and politics leads neighbouring countries, such as Taiwan and North Korea, effectively to become subordinate to the Chinese economy.

North Korea which has achieved impressive economic success for the past two decades, now becomes a country with a stable and active economy. In the 2010s, a steep increase of wages in China promoted the transfer of its labour-intensive industries to its neighbouring ally, North Korea. The border between China and North Korea begins to enjoy foreign capital flow from China. Kim Jong Un, with economic confidence, opens North Korea's door to South Korean companies from the early 2020s. The North Korean Government invests in developing ICT-intensive industries including the operating systems of computer games, smart phones, and network facilities. With this investment in ICT, the northern regime eagerly imports security technology such as RFID and biometric sensors.

In 2024, the North Korean regime provides at no cost a new Kim-family badge, which is actually an electronic tag for official activities. This badge automatically connects to the main control system of the Government, displaying peoples' identity, their movements, their economic activities, and even their access to the official network.

People are generally satisfied with their improved economic environment, but have become

aware of the impossibility of making systematic resistance to the regime in a web-based, central control system. The unofficial telecommunication network is completely terminated by a sophisticated jamming system adopted by Government. All IT devices now contain operating systems made in North Korea which automatically recognise people's access to unauthorised contents. However, North Korean people can enjoy foreign contents such as South Korean drama and music (*Hallyu* contents) through unofficially imported devices, but always have to be careful about being tracked by the Government. Despite the few exceptions of some unofficial devices, the 'smart' dictatorship of Kim Jong Un actualises the ubiquitous control over its people as was depicted in George Owell's novel *1984*.

Scenario 4. North Korea as a 'Quasi-democratic Society'

North Korea has made impressive economic progress due to low wage competitiveness compared with China and other neighbouring countries. However, the fruit of this improved economy has not been distributed evenly. Although riots against the corrupt dictatorship have spread by the day, Kim Jong Un refuses to accept political reform based on the needs of the North Korean people. As the unofficial telecommunication network emerges as a channel for political discontent, in 2020 Kim Jong Un prohibits ordinary people from using mobile phones which results in a fatal blow to his power. In 2021, young military officers supported by the new middle class which has accumulated wealth through the emerging unofficial network of mobile phones conduct a coup that ends with the dethroning the Kim family.

The newly-established leadership manages to maintain a diplomatic balance between China and South Korea to get maximum support. Since then, North Korea seems to be on the right track to democratic reform. North Korea now becomes an important manufacturing base for the companies of South Korea. Nonetheless, more than half of the North Korean people - who are excluded from the middle class, still prefer the authoritarian control of the Kim family to the new élite who try to establish policies representing the interests of the middle class. Although control over the use of the internet for the expression of critical opinion still remains, the ability for freedom of speech increases greatly. The North Korean people freely experience foreign contents, and the young generation starts to think of themselves as being cosmopolitan. The more North Koreans exchange ideas with South Koreans, the issue of reunification emerges naturally.

Conclusion

This study has been conducted on the premise that North Korea's ability to control its people's access to the outside world could be stymied by the growth of the unofficial telecommunication system. We will now consider the strengths and weaknesses of each scenario in terms of this basic premise.

Scenario One considers the economic decline of China and its influence on the future of the Korean peninsula. This scenario may be categorized as a 'Disciplined Society' as described in the concept of the four generic futures proposed by the Hawai'i Research Center for Future Studies. For the unofficial telecommunication network to expand within North Korea, it is essential for China to be the driving force of the economic growth of North Korea. However, in this scenario China loses its economic influence, and consequently the unofficial telecommunication network loses its driving force. Significant social change could not occur because the North Korean Government would be able to strengthen its control over the people's communications.

In Scenario Two, two important conditions are described - political chaos in China and economic cooperation with South Korea. These two conditions result in the increased usage of an unofficial telecommunication network with South Korea. This scenario is a combination of two of the scenario types of the four generic futures – the 'collapsed' authoritarian control of North Korea, and the 'continued (economic) growth' of South Korea. The Korean peninsula is dominated or led by the economy and culture of South Korea.

Considering the current situation in North Korea as described in this study, the first and second scenarios have some possibility of coming true. One feature of these scenarios is that there are no emerging issues regarding the unofficial telecommunications network. All characteristics of a North Korean future mentioned in these two scenarios are based on current trends, which are expected to make way for new trends based on current emerging issues. These characteristics can be seen as a strength in prognostication due to their giving a high possibility and connectivity with current trends to these scenarios. However, those characteristics can also be the weakness for these scenarios. Since there are no emerging issues dealt in these scenarios, it would be hard to use them for forecasting a long-term future.

Scenario Three is based on the successful economic growth of North Korea followed by a high-tech and ubiquitous control by the Government over its people. Advanced technology would be used to terminated the unofficial telecommunications network, which in turn would enable the Government of North Korea to open its door to South Korea with confidence because of its ability to control the country. This scenario may be compared with the 'Transformational Society' of the four generic scenarios.

The strength of the third scenario lies in that it shows the influence of emerging issues for prognosticating the future of North Korea. The potentiality of North Korea for the development of advanced technology for the purpose of controlling its own society is an important emerging issue in this scenario. However, the influence of countries surrounding North Korea has been ignored here. Advanced technology for the control of its people could be challenged by new forms of technology developed in neighbouring countries as has happened with the emergence of an unofficial telecommunications network.

The second function of mobile devices for use as a storage device should be carefully considered to provide more details for this scenario. As mentioned above, it is anticipated that one iphone-sized device could store data which is equivalent to one year of HD movies. This is enough information which if received could alter someone's views. Given that the dual telecommunication network is the core aspect of each of the four scenarios, North Korea is likely to continue to experience an increasingly close relationship to its neighbours. Therefore, the independent action of the North Korean Government which is described in the third scenario do not fit with the basic assumptions of this study.

The fourth scenario is focussed intensively on both inside and outside relationships between the Government of North Korea, the North Korean people and other changing factors. The relationship between the Government and the people has been changed due to the unofficial TC network, which becomes a channel for political discontent. In addition, the rising middle class is motivated by the economic wealth accumulated through the extension of the

unofficial TC market. In this scenario, the authoritarian regime is changed by the new élite which represent the interests of the middle class. The exchanging of opinions throughout the network is, to some extent, allowed despite the continued control of the internet.

The strength of Scenario Four lies in its being cautious about extremism. This scenario suggests that any change in the regime is likely to dissuade people from embracing the extremes of either authoritarianism or democracy. The regime is changed, but the society persists in a relatively slow transition from its past towards a more democratically influenced society. This cautiousness is why the topic of this scenario is described as a 'Quasi-democratic Society'. This quasi-democratic society reflects the preferred vision for the Korean peninsula by conveying the impression that both North and South Korea are working on creating a well-balanced society. More importantly, the unofficial telecommunication network would continue to play an important role in enabling the continued transformation of the Korean peninsula.

Endnotes

1. International Telecommunications Union, 'The World in 2013: ICT Facts and Figures'. http://www.itu.int/ITU-D/ict/mdg/storyline/index.html. See also: International Telecommunications Union, 'ICT Data and Statistics (IDS)'. http://www.itu.int/ITU-D/ict/mdg/storyline/index.html#_ftn1.

2. Nicholas Negroponte, *Being Digital*, p. 31.

3. Evgeny Morozov, *The Net Delusion: The Dark Side of Internet Freedom*.

4. In Actor Network Theory, non-human agency can be a subject equivalent to human agency to affect the system to which it belongs. See Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory*, p. 72.

5. Ibid., p. 76.

6. Ibid., p. 39.

7. Park, Sang Joo, 'Current State and Trend of Internet Service of North Korea', pp. 69-72.

8. Kang, Hyun Joo, 'Openning Era of 3G Network in North Korea'.

9. Nat Kretchun and Jane Kim, *A Quiet Openning: North Koreans in a Changing Media Environment*, pp. 54-55.

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13. Quoted in Ryu, Hyun Jung, 'A Study on North Korea's Dual Network of Mobile Telecommunications System', p. 71.

14. Marcus Noland, *Telecommunications in North Korea: Has Orascom Made the Connection?*, p. 12.

15. Ryu, op. cit., p. 69.

16. Gery Mendez, 'Moore's Law: The End is Near-ish!'

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25. Ibid., pp. 8-9.

26. Ibid., p. 9.

27. Ibid., p. 10.

28. Ibid.

29. Clem Bezold, 'Aspirational Futures', pp. 81- 90.

31. Quoted and rephrased from Dator's 'Alternative Futures', op.cit., pp. 14-15.

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