

A Systems Perspective of Foreign Intervention with Regards to the Democratic Peoples Republic of Korea

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Abstract

In support of the U.S. strategy other regional stakeholders, especially those in East Asia, with regards to diplomacy or strategic vision towards the Democratic People's Republic of Korea (DPRK) also known as North Korea, we used complex systems tools to understand the complex relations driving US policy towards Korea with a focus on the emergence and evolution of the informal Sino-DPRK markets. The informal border markets between China and DPRK have many unknown linkages due to the black and grey box access that the governments maintain to the area. Defining the causal relationships that link these complex, emerging markets together could reveal opportunities for policy improvements towards the region. I will try to answer how these markets are affected by technology and information, security and national policies, culture and the role of women, and also external regional/global pressures and policies. A transparent understanding of this system and how to measure the development progress of this phenomenon is currently immeasurable. However, these informal markets must be studied within the context of the larger complex issues surrounding DPRK, China, United States, and other regional actors

This model is a first step in developing a framework for strategic understanding of how DPRK is affected by the stakeholders with a strategic interest in Southeast Asia. We took advantage of complex systems diagramming tools such as Systemigrams, causal loop diagrams, and swim lane charts to develop these dependencies. We these used a functional hierarchy to describe in detail the various functions that affect the emergence of these informal markets. The next step in this research is to develop a model that ties all of these elements together to look at how these informal markets, along with other policy decisions such as sanctions, affect the DPRK.



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Abstract

In support of the U.S. strategy other regional stakeholders, especially those in East Asia, with regards to diplomacy or strategic vision and the role of sanctions towards the Democratic People's Republic of Korea (DPRK) also known as North Korea, we used complex systems tools to understand the complex dependencies driving U.S. policy towards Korea with a focus on the emergence and evolution of the informal Sino-DPRK markets. Specifically, we focused on the informal border markets between China and DPRK and their many unknown linkages and second order effects. Defining the causal relationships that link these complex, emerging markets together could reveal opportunities for policy improvements towards the region. We will try to answer how technology and information, security and national policies, culture, and also external regional/global pressures and policies affect these markets. A transparent understanding of this system and how to measure the development progress of this phenomenon is currently not quantifiable. These informal markets are discussed within the context of the larger complex issues surrounding DPRK, China, United States, and other regional actors

This systemic approach presented is the first step in developing a framework for strategic understanding of how DPRK is affected by the stakeholders with a strategic interest in Southeast Asia. We took advantage of complex systems diagramming tools such as Systemigrams, causal loop diagrams, loop analysis, case trees, and swim lane charts to develop these dependencies. We these used a functional hierarchy to describe in detail the various functions that affect the emergence of these informal markets. The next step in this research is to develop a model that ties all of these elements together to look at how these informal markets, along with other policy decisions such as sanctions, affect the DPRK.

Key Words: North Korea, systems tools, informal markets, causal loop diagrams, systems diagramming

¹ The views and opinions expressed or implied in this white paper are solely those of the authors and should not be construed as policy or carrying the official sanction of the United States Army, the Department of Defense, United States Military Academy, or other agencies or departments of the U.S. government.

1. Introduction

In 2002, President George W. Bush labeled North Korea part of an "axis of evil" and an "outpost of tyranny". Many outside organizations describe North Korea as a totalitarian Stalinist dictatorship with an elaborate cult of personality centered on the Kim family and having one of the lowest United Nations or UN-ranking human rights records of any country. Estimates state that, from a population of approximately 22 million, between 900,000 and 3.5 million people died from starvation or hunger-related illnesses, with the deaths peaking in 1997 (Haggard and Noal, 2011b). Along with sanctions, irresponsible foreign and domestic behavior, and a regime that prioritizes military spending over social spending, conditions for the average person in North Korea continue to worsen. Figure 1.1 below shows the possible outcomes of a continued deterioration conditions in North Korea.

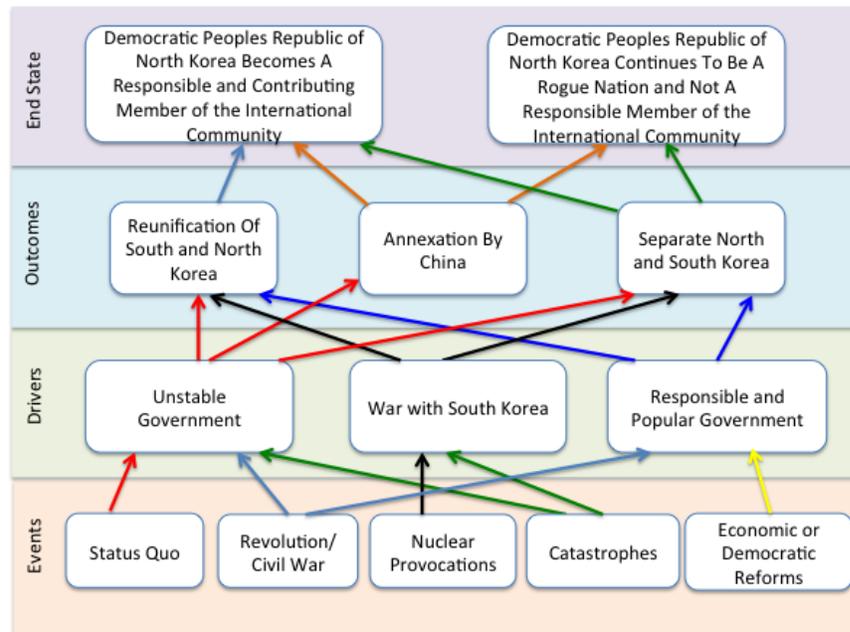


Figure 1.1 Events, drivers, outcomes, and end state of North Korea

After the devastating famine and crippling international sanctions of the 1990s, the inhabitants of North Korea were left to fend for themselves without little governmental support. As a result they turned to the black market as a necessity. Nowadays, the black market has been unofficially institutionalized in the everyday lives of almost all North Koreans. Parallels can be drawn between how the black market operates in Cuba and those in North Korea. Despite cautious economic reform in 1999-2002, the country quickly reversed course and has attempted multiple times to stop the spread of these informal markets. The informal markets have only grown stronger and more complex over time. One goal of this research is an attempt to depict the effects of the informal markets on Sino-DPRK relations through a systemic approach following a structured decision process. By first analyzing the regional effects, we hope to be able to expound on its global effects after. Based off our analysis, we will create a model that will help assist policy makers with regards to better understanding the Sino-DPRK informal market system.

The informal border markets between China and DPRK have many unknown linkages due to the black and grey box² access that the governments maintain to the area. Defining the causal relationships that

² A black box system that is viewed or described solely in terms of its input, output and transfer characteristics without any knowledge of its internal workings. For a grey box system there is some knowledge of the internal working but it is by no means well understood or documented.

link these complex, emerging markets together could reveal opportunities for policy improvements towards the region. The systems techniques introduced in this paper will be used to answer how these markets can further advance U.S. goals for the peninsula.

The second goal of this research is to provide a framework for viewing a complex system such as a nation state using formal systems-thinking tools. A quantifiable framework based upon a systemic approach would remove a lot of biased and subjective assumptions in policy-making that has consistently not worked in containing North Korea's nuclear ambitions and pushing the country towards becoming a responsible member of the international community. Too often policy-makers and policy-advisors are trapped by a narrow-minded analysis in which only one dimension of the issue is analyzed, also known as "siloeing". Dialogue concerning international policy and issues would be more effective and efficient if the secondary causes and effects were equally as visible and understood as the primary ones. Furthermore, it contributes to solving the root of the problem as opposed to treating the symptoms.

There is currently little or no published quantitative type systems assessments that help drive U.S. policy towards this region that we could find in the literature. In addition, a transparent understanding of this system and model of how to measure the developmental progress of this phenomenon is currently not available. The available methods currently employed by think tanks and governmental organizations are based on intuition and purely qualitative assessments. A quantitative assessment will add logic and scientific accuracy to decisions made towards DPRK. Since the DPRK is not a static object and will experience constant change, this model will require timely updates for future quantitative assessment of policies towards the region.

The sum of this paper is to assist organizations and policy makers with a model and set of tools that deals with North Korea on a less qualitative basis. The benefactors might include United States (U.S.) Department of State (DoS), Department of Defense (DoD), United States Institute for Peace (USIP), Asia Foundation, the members of the Six-Party Talks³, as well as any additional organizations not listed here.

2. Literature Review

2.1 Introduction

Like many other Soviet allies of the Cold War era, the Democratic Peoples Republic of Korea (DPRK), the official name of North Korea, was not unique in relying heavily upon the Soviet Union to maintain its centrally planned economy. However, the dissolution of the former Soviet Union led to the implosion of North Korea's industrial and agricultural economy (Haggard and Nolan, 2011a). A famine quickly set in and the government began suppressing consumption by cutting rations delivered by the public distribution system. Most academic research suggests that between 1994 and 1998, the famine killed 600,000 to 1 million people (Lee, 2003).

Since the state could no longer fulfill its role as the provider of food, households had to rely on their own efforts in order to secure food. With the withdrawal of state control and influence, these individuals resorted to purchasing food and selling their own belongings or assets stolen from their work in the emerging informal markets. Gradually, the marketization that began with food started to include a broader range of goods such as household items, state assets, and services.

The resulting markets mentioned above are considered illegal by the North Korean government. North Korea remains one of the last states to exercise a centrally planned economy. The government officially employs a Leninist-socialist public distribution system that rations out everything from clothes to foods. All

³ The six-party talks aim to find a peaceful resolution to the security concerns as a result of the North Korean nuclear weapons program. There has been a series of meetings with six participating states to include North Korea, South Korea, China, U.S., The Russian Federation; and Japan. These talks were a result of North Korea withdrawing from the Nuclear Non-Proliferation Treaty (NPT) in 2003, taken from Wikipedia at http://en.wikipedia.org/wiki/Six-party_talks, 11 May 2012

businesses that exist legally are sanctioned and owned by the government. In addition, all income earned will first head to the Kim family's personal finances before trickling down to populace.

2.2 Current Scope of the Informal Markets

The North Korean government is notorious for being secretive. The only living sources from that country include refugees and limited data gathered through non-governmental organizations or NGOs. Attempts to quantify the scope of this marketization process have been carried out through eyewitness accounts and aggregate balance sheet exercises undertaken by Haggard and Noland (2011a), then later refined in their later publication of "Witness to Transformation: Refugee Insights Into North Korea," which is the main source of literature used for this paper. The general conclusion is that for the non-privileged classes, the market became the primary source for securing food during the famine period and has continued to serve that role ever since. Today, the markets have expanded its services to include the ability to acquire foreign media and goods. Refugee surveys show that only under 15% of those surveyed had their food and income come primarily through the government's public distribution system. Some defectors even attest that their entire income was derived from the market.

The North Korean regime initially tolerated this marketization but by 1998 a slow recovery process began to take hold. In 1992, the government seemed willing to accept that reform was needed by attempting to change relative prices and wages by aligning them more closely with actual supply and demand (Haggard and Nolan, 2011a). But beginning in 2005, the government abandoned the reforms and revived the public distribution system. Ever since, the government has experimented with one policy or another in an attempt to squash the markets. In 2006 and 2007, the government increased production quotas on cooperative farmers, placed new restrictions on cooperative managers, private plots, and cooperative leasing of land. On November 20, 2009, the government introduced a currency reevaluation that essentially wiped out all value from the DPRK currency. The intent was to target the illicit markets and make it almost impossible to conduct business transactions there. However, the markets survived because the people of DPRK had already begun hoarding and trading with foreign currency as opposed to state currency. As a result, the victims of the hyperinflation were those who were actually strictly law-abiding citizens. The results were so disastrous that the North Korean finance chief, Pak Nam-gi was executed.

The regime has also sporadically carried out large-scale police sweeps of areas where the markets are most prevalent, but not only do the markets survive, but the reaction from the people in response to the sweeps is increasingly bitter. As long as the state continues to fail in replacing the market system as an adequate provider of food and goods, the informal markets will continue to survive and evolve.

NKDaily⁴, one of the leading news observers of North Korea, states that these underground markets have appeared all over the country, to include the capital of Pyongyang. An accurate quantification of the distribution of the markets throughout the state does not exist; however, the main logical assumption is that the markets are more prevalent in the Northern provinces near China (see Figure 2.1) where the main hub of smuggling occurs. This belief is also reinforced through the NKDaily reporting on government's sweeps focusing on areas in the north. As one progresses further and further south, the number of markets would decrease accordingly.

⁴ The NKDaily can be viewed in English at <http://www.dailynk.com/english/>



Figure 2.1 Sino-DPRK border⁵

2.3 Foreign Influence on DPRK

After 2002, the U.S., South Korean, and Japanese policies towards the region focused mainly on enforcing UN weapons and luxury goods sanctions, the withholding of food and oil aid, and a trade embargo due to DPRK's refusal to dismantle its nuclear program. The withholding of aid can be argued that it helped contribute to the massive starvations experienced during the famine period, however, informal reports and observations show that the overwhelming majority of international aid never reach their intended targets but are instead funneled into the military and government elites.

According to "North Korea: U.S. Relations, Nuclear Diplomacy, and Internal Situation," by Emma Chanlett-Avery (see Chanlett-Avery, 2011) which was published as a congressional research service report, the U.S. is concerned with Pyongyang's human rights record, illicit activities, missile programs, and nuclear development. In addition, Pyongyang has a history of launching provocative attacks on South Korea, who is an important U.S. ally in the region, further increasing the strain on U.S.-DPRK relations. Furthermore, even before the current impasse of the Six-Party talks, North Korea has repeatedly made agreements and then failing to deliver on their end, while simultaneously demanding food and oil aid. The current U.S. political administration has struggled to find a reason to authorize food aid to North Korea because of its history of diverting aid from the people and towards the government organization.

Another important source of information regarding U.S. and DPRK relations stems from the U.S. Department of State's website⁶. In January 2007, the UN Security Council passed Resolution 1718, and the U.S. Department of Commerce followed by prohibiting the export of luxury goods to North Korea. Statutory sanctions on North Korea and multilateral arrangements prevent the trading of weapons or

⁵ Taken from <http://geology.com/world/north-korea-satellite-image.shtml>

⁶ See <http://www.state.gov/r/pa/ei/bgn/2792.htm>

military-related items. Aside from purely humanitarian assistance, there is virtually no economical link between the two states.

In order to understand Sino-DPRK relations, the following reference “China’s North Korean Policy,” by Bates Gill (see Gill, 2011) was heavily referenced. The sanctions mentioned earlier have driven North Korea to develop a closer relationship with its neighbor, China. By 2010, China has been estimated to account for over 40% of international trade with DPRK. In addition, since the marketization of China, South Korea has become one of China’s larger trading partners⁷. The economic success spurred by this relationship would encourage China to placate North Korea in order to be on better diplomatic terms with a much more economically valuable South Korea.

Within North Korea, Chinese investments have mainly targeted the mining and minerals sector. The investments are long-term and the scale is large. The construction of railroads, shipping centers, harbors, roads, and power plants have accompanied the investments. The proximity of North Korea and China’s northeastern provinces will translate to increased economical growth in that region, which in particular appeases China because those provinces have been experiencing labor unrest. Reforming North Korea to more of a free market would propagate stability of these long-term strategic investments.

Current U.S. policy focused on sanctions and isolation directed towards the DPRK is not working. North Korea has continued to develop weaponized nuclear capabilities as well as ignoring its troubling history of human rights violations. North Korea also seems to be getting more diplomatic victories and concessions from the U.S. as opposed to vice versa. If the U.S. wants to create effective foreign policy directed towards DPRK, the entire issue needs to be reanalyzed and understood as a system. Policy-makers must first understand how different events and interdependencies within North Korea are related and affected.

2.4 Complex Systems Diagramming and Modeling Tools

This systemic approach presented is the first step in developing a framework for strategic understanding of how DPRK is affected by the stakeholders with a strategic interest in Southeast Asia. We took advantage of complex systems diagramming tools such as Systemigrams, causal loop diagrams and swim lane charts to develop these dependencies. We these used a functional hierarchy to describe in detail the various functions that affect the emergence of these informal markets.

2.4.1 What is a Complex System?

As we think about the capacity of a nation state such as North Korea and its ability to provide a safe and secure environment, a stable government, essential services, and a healthy economy it is useful to take a systems thinking approach in order to better understand the various elements and the complex relationships involved.

We begin by categorizing a nation state as a complex system that exhibits a unique set of behaviors. Figure 2.1 shows how a complex system in the hierarch of systems. Table 2.1 categorizes the behaviors of nation state as those of a complex system using the schema outlined in Ireland and White (2011) and Sheard and Mostashari (2008). The elements that comprise the nation state’s efforts in each of these areas by themselves can be considered some level of a system and so it is arguably more appropriate to consider these efforts as a complex system consisting of numerous enterprises for our modeling purposes. When one considers the many components involved as a nation state tries to achieve its objectives of providing security, stable governance, and economic opportunity to its citizens it is easy to

⁷ Exports from South Korea grew from \$69.5B to \$116.8B where imports during that same timeframe grew from \$48.6B to \$71.6B. Taken from

http://www.mofat.go.kr/webmodule/htsboard/template/read/engreadboard.jsp?typeID=12&boardid=8110&seqno=310061&c=&t=&pagenum=1&tableName=TYPE_ENGLISH&pc=&dc=&wc=&lu=&vu=&iu=&du=. China is the largest importer of South Korean goods and services.

see that it qualifies as a complex system.

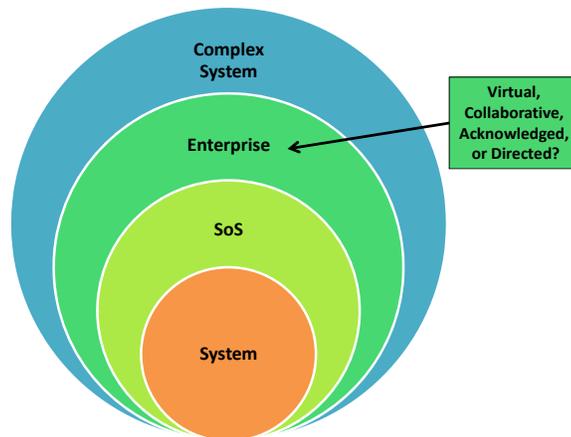


Figure 2.1 Hierarchy of systems (from White, 2011)

Systems thinking tools and characterizations are key to help understand the interdependencies of the various agencies, actors, products, constraints, etc. that can affect a country's capacity. Figure 2.2 depicts various diagramming and modeling tools that can be used for complex systems.

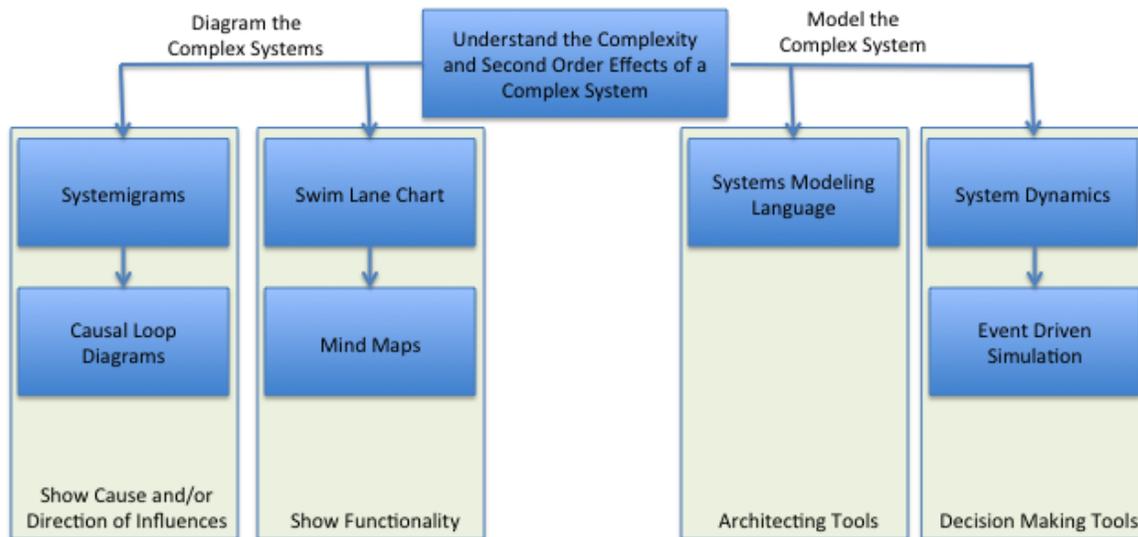


Figure 2.2 Complex systems diagramming and modeling tools

Table 2.1 Complex systems behaviors

Sheard and Mostashari (2008)	Ireland and White (2011)	Nation State System Behavior
1. Autonomous interacting parts (agents)		The elements are heterogeneous, with building blocks (agencies, processes, external stimuli, etc.) that are individual agents of the systems.
- Fuzzy Boundaries	Exhibits tight and loose couplings	Interactions vary dynamically with boundaries (responsibilities and products) that are often ill defined.
2. Self-organizing	Self organized	Nation states are continuously realigned based upon the affinity of the elements (leaders, organization, elected officials, etc.).
- Energy in and out	Thrives on diversity	Nation states exist and function based upon intricate and multifarious interrelationships.
3. Display emergent macro level behavior		Nation states are social institutions with structure not tied to human bodies.
- Nonlinearity		Investments in security, governance, and economic development often do not translate directly to improved living conditions or a countries' capacity to develop basic services.
- Nonhierarchy and central authority	Many factors at play	No one group understands all of the activities or rational behind its mission yet typically government is controlled by a central authority. Identifying and building common ground is necessary for progress.
- Various scales	Sensitive to small effects	Processes and activities exist at all levels. Small changes at most levels can lead to significant changes in a nation state.
4. Adapt to surroundings (environment)	Internal and external relationships are key	Governments continue to adapt to leadership, external stimuli, and a host of other events either locally or at the global level. Internal and external relationships are the enablers of change.
- Become more complex with time; increasingly specialized	Evolves on its own as a whole	Ideally a nation state evolves with the social-technical aspects of the global market and security environment. Elements or the complex system as a whole can evolve.
- Elements change in response to pressures from neighboring elements	Ever changing	Processes, products, people, etc., continue to evolve. Most nation states have no status quo otherwise that cannot serve the basic needs of its people.
	Acts robustly	A healthy nation state can survive significant changes in environmental events (natural or manmade events) and still perform basic functions.
	Stimulates different perspectives	New ideas continually evolve from normally the democratic process. Government and country capacity must adopt to the social/technical/economic realities of the 21 st century.
	Informs the observer	Often external intervention is required for governments to meet the needs of its people. Internal stakeholders often do not understand what must be done to improvement government.
	Performs openly	Transparent government is one of the key tenets of democracy. All stakeholders typically know internal and external outcomes.
	Surprising emergence	Behavior, at all levels, is often unexpected. Religion, history, etc., are often not indicators of future behavior.

2.4.2 Systems Diagramming Tools

Systemigrams

Professor John Boardman, pioneer of the systemic diagrams, better known as “Systemigrams” developed this model in the late 1980’s. The word Integration in a political, technical, and conceptual sense will be used in order to introduce and analyze the subject matter of Systemigrams: “what they are, how they are created, who would want to use them and why, and where they are headed as a decision-support tool” (Boardman and Sauser, 2008). According to Boardman, for the past twenty years “we are still convinced that these same types of integration continue to impact us, interdependently, and little wisdom seems to have been received in the interim to distinguish between them, let alone solve them, a meta-integration problem that emphasizes the complexities we confront.” Furthermore, Systemigrams have a multitude of uses in business, transportation, military operations, and for the most part any topic matter that requires graphical representations of system’s sub systems and their interdependencies.

The evolution of Systemigrams may be considered in three phases according to Boardman: “its development as a form of visual language, its adaptation as a methodology for business architecting, and its refinement as an appreciative learning system. In Phase 1, development of the technique concentrated on the graphical portrayal of structured prose” (Boardman, and Sauser, 2007). Boardman also notes that there are other diagrams in academia that capture interdependent concepts such as concept diagrams, concept mapping, fishbone diagrams, influence diagrams, and even the original flow charts. However, what differentiates these diagrams from Systemigrams is that these other diagrams are:

“Largely memory less, capturing the immediacy of prose but then forgetting and moving on to the next local piece of knowledge, making it more difficult to find longer thought threads since they concentrate on linear thinking rather than holistic thinking.”

Ultimately, Systemigrams were intended to convey a synergy of prose and pictures, furthermore embodying the best features of each. It is critical to note that the Systemigram must be correlated to the text that it represents, “recovery of the original prose by inspection of the diagram a key requirement.” Those requirements are:

Rules for Prose

1. Address strategic intent, not procedural tactics.
2. Be well-crafted, searching the mind of reader and author.
3. Facilitation and dialogue with stakeholders (owner/originator of strategic intent) may be required to create structured text.
4. Length variable but less than 2000 words; scope of prose must fit scope of resulting Systemigram.

Rules for Graphic

1. Required entities are nodes, links, inputs, outputs, beginning, and end.
2. Sized for a single page.
3. Nodes represent key concepts, noun phrases specifying people, organizations, groups, artifacts, and conditions.
4. Links represent relationships and flow between nodes, verb phrases (occasional prepositional phrases) indicating transformation, belonging, and being.
5. Nodes may contain other nodes (to indicate break-out of a document or an organizational/product/process structure.
6. For clarity, the Systemigram should contain no crossover of links.
7. Based on experience, to maintain reasonable size for presentation purposes, the ratio of nodes to links should be approximately 1.5.
8. Main flow of Systemigram is from top left to bottom right.
9. Geography of Systemigram may be exploited to elucidate the “why,” “what,” “how” in order to validate the Transformational aspect of the systemic model.

10. Color may be used to draw attention to subfamilies of concepts and transformations”.

A Systemigram for the informal markets in DPRK will be presented in Chapter 4.

Systemigrams are used today to analyze interdependencies and relationships in order to tackle issues such as counterinsurgency in Afghanistan, narco-trafficking in Mexico, complex commuter rail systems, and nuclear weapons proliferation. They are a powerful tool for capturing the interdependencies between functions and actors. Furthermore, Systemigrams provide us with “a basis for systems architecting, in terms of both enterprise integration (reliant on business process architecting) and technology systems development (reliant on requirements management)” (Boardman and Sauser, 2008). Ultimately, whether you detest Systemigrams for their resemblance to a bowl of spaghetti and meatballs or love them for their holistic representation of interdependencies and relationships, Systemigrams are a graphically thorough way of demonstrating the flow of sub systems throughout a system.

Causal Loop Diagrams

A very useful approach in the realm of system thinking is using feedback loops to show interdependencies between variables that define the system. When these feedback loops are combined it creates a visual qualitative measure known as a causal loop diagram. By definition a causal loop diagram is a map showing the causal links among the variables with arrows from a cause to an effect. Causal loop main benefits include: quickly capturing the hypothesis about the causes of dynamics, eliciting and capturing the mental models of individuals or teams, and communicating the important feedbacks that are believed to be responsible for a problem (Sterman, 2006).

The key concepts to understanding a causal loop diagram include the polarity of the arrows, and the overall feedback loops polarity. To break it down even more, a when connecting variables using an arrow, the arrow in a causal loop diagram will have a positive or negative head in direct relation to how it affects the variable it influences. A very basic version can be seen in Figure 2.3, where we have three variables that influence one another, a chicken, number of road crossings, and the number of eggs. The positive polarities on the arrows show that as the number of eggs increases so do the chickens. At the same time, as there are more chickens it will have a positive increase on the number of eggs in the system. Building off of this concept, a causal loop diagram can also tell how the loop affects the overall system. The overall polarity of the loop is either a reinforcing (positive) loop or a balancing (negative) loop to the overall system. The chicken and eggs loop is self-reinforcing to the system. Without any other variables in the system, the chicken and eggs will see an exponential growth as nothing will inhibit its positive growth .

In this example a road crossings variable will be added to the system to regulate the number of chickens. As the chicken carrying capacity increase they will attempt more road crossings, thus a positive relationship between chickens and road crossings. As more attempt the road crossings, the road will decrease the number of chickens. This overall loop has a balancing affect to the number of chickens in the system. The overall causal loop diagram showing the interactions in the system of the chicken population carrying capacity is displayed in Figure 2.3.

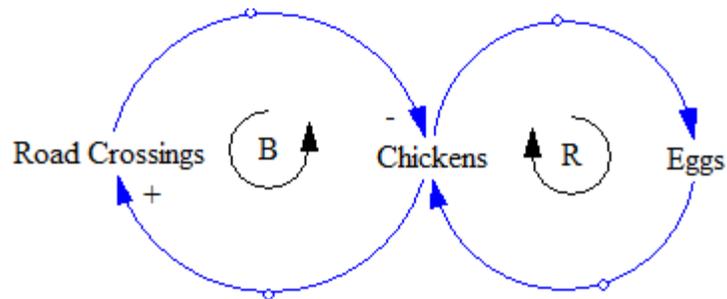


Figure 2.3 Causal Loop Diagram

Causal loop diagrams are a useful tool in qualitatively displaying the interdependences of variables in a system. The causal loop diagram does not have a limit to the number of variables or loop structures that can be displayed. They are useful in quickly capturing the problem and an easy tool for communication purposes. The next step in the system dynamics solution formulation process is to transition the information displayed in a causal loop diagram and transition it into what is known as a stock and flow diagram, for a quantitative output.

Function Hierarchy and Functional Flow Diagrams

A function hierarchy is a freely definable structure used to organize functions and sub functions. Affinity diagrams are the technique of choice when developing functional hierarchies. Functional flow diagrams can then be used to define the relationship and functions. We used a functional hierarchy to develop a representation of the illicit markets in Chapter 4.

Swim Lane Charts

Many researchers and systems of systems analysts inquire into the purpose and usage of swim lane charts and exactly what makes them an efficient systems tool when analyzing systems of systems relationships. According to *Microsoft Visio™* a swim lane chart is a visual element used in many types of process flow diagrams, or flowcharts that visually distinguishes responsibilities for sub processes of a business process. It is important to note that swim lanes can be horizontal and vertical and divided up into sectors (i.e. customer, sales, contracts, inputs, resources, etc.) Additionally, according to *Agile Modeling* swim lanes are often used in manufacturing processes in order to clarify the overall layout of the processes that would assist with the optimization of floor capacity, efficiency, output, and ultimately lean operations. Furthermore, why use a swim lane chart in place of or in addition to a Systemigram? In relation to nation building swim lane charts are an efficient way to see relationships between stakeholders, programs, capabilities, inputs and resources without the reader being overwhelmed with a chart that resembles a large and intricate spaghetti diagram (i.e. Systemigram).

2.4.3 Systems Modeling Tools

System Dynamics

Usefulness of the analyses tool created at the conclusion of this project can be determined not only from its success in a practical application but also when it is compared to any previous solutions created dealing with similar research variables. Through various research of published work it has been determined that this methodology has widespread use but has yet to be created in determining the butterfly effect across regional areas. It has had some significant use in determining policy effects on the fight against Middle Eastern terrorist groups or even explaining regional development in regions under constraints of water resources. Understanding that this process is useful in explaining qualitative and quantitative values separately and their influence on a region then this tool will attempt to combine those variables to help explain the large-scale influence over a specific region such as the Korean peninsula.

3. Model Development

3.1 Methodology

The methodology used in this report is based on the systems decision process shown in Figure 3.1. One of the strengths of using such a structured process is that detailed methods, processes, and tools (MPTs) along with a structured decision process is formalized.

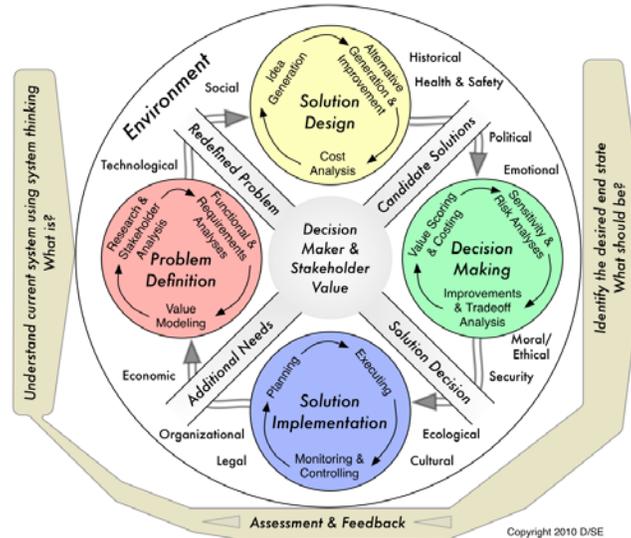


Figure 3.1 The West Point systems design process (from Parnell, et al, 2008)

This paper maps out the complex informal market system between China and DPRK through the use of a systems diagramming tools. This qualitative tool will assist decision-makers in understanding potential second- and third-order as well as causal effects of major events that occur within the system. Once the system or the environment has been established and defined, qualitative value modeling will be utilized to describe and measure the extent of the second- and third-order effects and better assist in making policy decisions about this region.

To begin the study, a literature review and stakeholder analysis was conducted to develop the problem statement. Through the first two-key tasks, a Systemigram was created to describe the current state of the system to better understand the problem. The Systemigram should be primarily used to help visualize likely outcomes within and affecting the system. A Systemigram uses a verbal descriptor to describe how the interdependencies relate. It is good for developing insight into complex behaviors.

Another systems-thinking tool used to understand the problem is the causal loop diagram. While a Systemigram uses verbs to describe interdependencies, a causal loop diagram shows continuous positive or negative reinforcement. It provides a schema for identifying balancing and reinforcing behavior and like the Systemigram, is good for developing a systems dynamics model.

In addition to the two aforementioned systems diagram tools is the swim lane chart. A swim lane chart organizes interdependencies into separate visual categories in order to illustrate different functional responsibilities.⁸ Figure 1.1 is an example of a swim lane chart.

⁸ Taken from Wikipedia http://en.wikipedia.org/wiki/Swim_lane, accessed May 6, 2012

Lastly, utilizing the information gained from the literature review and interviews with North Korean experts, a functional hierarchy representation model was developed. The decomposition of tasks into functions provides a more accurate view of current functionality. This also facilitates a more practical approach for abstracting functions from a functional view of a system.

The common perception is that North Korea behaves illogically and without reason, and that any attempt to derive a pattern is futile; however, while that statement may or may not be true, this study will not only attempt to reveal “normalcy” and predictability from the Kim regime, especially with respect to how the government deals with the spread of the informal markets, but also whether political and/or economical trends can be divulged and then exploited with U.S. or international policy. This series of model’s is a first step in developing systems based framework for strategic planning towards North Korea. Functional hierarchy, swim lane charts, casual loops diagram, and Sytemigrams can all be used to develop the dependences of various actions within North Korea. All four of these tools are techniques for describing relationships and interdependencies of a complex system.

In order to develop a complete understanding of North Korea we will need to delve into the dependencies, goals, desired outcomes, etc., of many external and internal actions. We chose one factor, informal markets, and their role on the behavior of the North Korea government and people. Other factors such as international sanctions, relationships with China and South Korea, military buildup, role of information, etc., all must be analyzed in depth to develop an understanding as a first step towards quantifying the results of various policy decisions.

4. Problem Definition

4.1 Introduction

The very existence of the informal markets is an act of defiance against the Kim regime. What started as a survival mechanism has evolved into a coping mechanism (Park, 2011); some reports indicate that the markets have further developed into a mature, complex network that people have come to accept as part of everyday life. An opportunity is present to delve into the mechanics of the system and whether it reveals anything about the larger strategic picture of DPRK. We also used systems diagramming tools to try and understand where informal markets fit into the socio-economic fabric of North Korea.

The current decision-making process of U.S. policy makers relies heavily upon intuitive, subjective analysis, etc. However, if the current process could be included along with scientific, quantitative analysis, the decision-making would be more consistent and accurate in reaching the desired outcomes or effects.

The key to good strategic decision-making and negotiation is to understand what the opposing party, which in this case is DPRK, is thinking and what they have or are willing to offer. For too long, the media has categorized Pyongyang as irrational and unpredictable. Nonetheless, every decision, especially at the state level, undergoes a rational process based upon advisers that do their best to ensure the continued existence of the state.

Although this paper does not attempt to force the informal markets to the strategic priority level, it does endeavor to explore a different method used to gauge the capabilities of the government to handle a complex internal issue influenced by domestic and external forces which are coming from China, U.S., South Korea, Japan, and the UN.

A systems-based assessment like the one presented in this paper will not only help understand the situation in that state, but also help U.S. decision-makers predict, react, and counter the actions carried out by Pyongyang. This assessment or tool is objective in nature and examines causal relationships through measureable or quantifiable data.

4.2 Stakeholder Analysis

The primary stakeholders identified are the Chinese national government, DPRK national government, DPRK dependents that include the merchants and consumers, and the US. For the sake of organization, the conclusions for each entity are drawn from the findings across the board.

4.2.1 Chinese National Government

China's stakeholder views and assessment shown in Table 4.1 were drawn from China's North Korea Policy: Assessing Interests and Influence by Gill (2011), China's North Korea Dilemma by Swaine (2009), North Korea, Inc. by John S. Park, and Chinese Views: Breaking the Stalemate on the Korean Peninsula by Snyder and Wit (2007).

4.2.2 Informal Market Dependents in DPRK

The stakeholder assessment of the informal market dependents such merchants, consumers, and anyone who draws a source of income or livelihood like authorities who accept bribes is shown in Table 4.2. This information was drawn from various expert opinions, news articles especially from the DailyNK and NKEconwatch, and defector testimony and surveys, especially from *Witness to Transformation: Refugee Insights Into North Korea* (see Haggard and Noland, 2011b).

4.2.3 DPRK National Government

The stakeholder assessment of the DPRK national government was drawn from various expert opinions and news articles especially from the DailyNK and NKEconwatch, as well as defector testimony and surveys from *Witness to Transformation: Refugee Insights Into North Korea* by Stephan Haggard and Marcus Noland, *China's North Korea Dilemma* by Swaine (2009), and *North Korea, Inc.* by Park (2009).

Table 4.1 Findings and conclusions for Chinese National Government

Findings

- In 2006, China harshly criticized North Korea's nuclear bomb test and agreed to support UN sanctions against DPRK. But in 2010, after North Korea's sinking of South Korea's Cheonan and shelling of Yeonpyong Island, China called for restraint and the restart of the Six-Party Talks.
- Beijing also took several days to issue a statement in response to the multinational investigation into the sinking of the Cheonan.
- China expressed loud dissatisfaction with the U.S. – South Korean military exercises in July 2011.
- Trade volume between China and North Korea has grown six-fold between 2000 and 2009. China's exports to North Korea nearly doubled from 2007 to 2008 alone.
- China has not been enforcing the luxury brand goods against DPRK sanctioned by the UN.
- Beijing has refused access to China's northeast areas bordering North Korea to the UN High Commissioner for Refugees.
- "In recent years, especially since Pyongyang's actions have become more and more provocative and troubling, it appears that certain interests and the influence of certain actors behind them have gained ground to coalesce around a North Korea policy that emphasizes economic development in North Korea and a closer understanding of and relationship with the North Korean political-military system."
- An increasingly large number of actors are showing an interest in China's foreign policy to include:
 - Traditional elements within the government and Communist Party
 - People's Liberation Army
 - Local governments
 - The media
 - Financial institutions and major enterprises
 - Netizens
- The general consensus among experts is that the Chinese prioritize stability in the North Korean region.
- China expects an overwhelming flood of refugees into its northeastern provinces in the event that the regime collapses.
- Expansion in the forms and contents of Chinese expression due to the Information Technology revolution.
- Chinese Premier Wen Jiabao visit to North Korea in October 2009, was the first by a Chinese premier since Li Ping in May 1991. Activities included signing numerous agreements on trade, technology, and development, among them related to computer software, economic assistance, tourism, educational exchanges, and wildlife protection. They also established "green channels" to ease customs procedures at certain border crossings.
- China and DPRK have historical and political ties:
 - Alliance and joint sacrifice in the Korean War
 - Common history as communist states
 - Their shared experience as postcolonial countries in the developing world
 - A shared self-perception as aggrieved, weak countries that can stand up to stronger powers
- In speaking of China-North Korea ties in late 2010, the Chinese ambassador to Pyongyang expressed a confidence rooted in "the glorious history of the China-DPRK ties, in the profound friendship between the two peoples and in the expanding common interests of the two countries."
- The CCP Central Committee handles foreign visits from DPRK leaders rather than the Ministry of Foreign Affairs.
- During the January 2011 China state visit, President Obama underscored the need for China to leverage its unique relationship with North Korea to compel Pyongyang to abide by its commitment to the 2005 Joint Statement of the Six-Party Talks as well as its obligations under UNSCR 1718 and 1874.
- Both leaders agreed that the complete denuclearization of the Korean Peninsula remains the paramount goal and that North Korea must avoid further provocations.
- China is working closely with the U.S. other partners and allies at the UN to develop an appropriate UN response to the DPRK's uranium enrichment program.
- North Korean defectors are arrested and sent back to DPRK.
- Majority of Chinese investors in North Korea are not State Owned Enterprises (SOE), but privately owned companies and provincial, prefectural, and municipal-owned.

Conclusions

- Beijing has not followed Washington, Seoul, or Tokyo in pulling away diplomatically and economically from North Korea.
- Deepening of opinion among Chinese elites on foreign policy although they all agree on stability.
- China desires market reform in North Korea.
- China does not want the presence of nuclear weapons in the Korean peninsula.
- China desires a stable Korean peninsula.
- China prefers negotiations through the Six-Party Talks.
- China values its shared common history with North Korea.
- China dislikes U.S. influence in the Pacific region.
- China's interactions with North Korea are becoming increasingly complex due to increased actors and widening of opinion.
- China's policy towards North Korea ties in nuclear disarmament, shared history, USA-ROK-Japan activity in the Pacific, DPRK stability, and China's own economic drive. These commonalities play an important role in maintaining friendly relations between these two states.
- A stable environment is conducive for economic development and China is adamant on maintaining the status quo for that very reason.

Table 4.2 Findings and conclusions for informal market dependents

Findings

- Started in response to the famine in the 1990s when the government, with the collapse of the public distribution system, failed to provide enough food for its people.
- Provides goods that the government fails or refuses to provide.
- Government attempts to stop “smuggling” have been met with local resistance, including from local security forces.
- 25% of interviewed defectors claimed to have received all their income from the market.
- Defectors come from all walks of professions
- Increased accesses to telecommunications and outside news expand communication capabilities and knowledge of outside world.
- Every male is assigned a job or duty within their collective, while women are expected to remain at home. This provides an opportunity for women to work jobs not sanctioned by their government.
- “All big traders work under the protection of the security forces.”
- “People also see commercials for things like shampoo, toothpaste and razors in the dramas, and then the next day they go out looking for it,” the source continued, going on, “Smuggling methods are so well developed now that you can order something from China and get it the next day. More and more people are looking to buy South Korean shampoo, soap, toothpaste and USB drives.”
- Local authorities habitually collect bribes from the merchants in informal markets.
- “In the Uiyeondong area of Hyesan, a metals trader who was under the protection of local forces was caught in a Storm Trooper inspection, so a fight broke out between them.”
- “Since these people live off bribes paid by the traders, they fight with them on the basis that they are ‘taking away my rice bowl.’”

Conclusions

- Informal businessmen provide necessary goods for survival and are protected by local security officials.
- Local security forces depend on bribes for sustenance and are willing to defend their source of income from national forces.
- National crackdowns on smuggling cause conflicts with the existing local security forces.
- Local security forces rely on bribes for income and survival.
- The informal markets are highly developed and mature.
- Women are able to work in the market more easily than men due to government’s oversight.
- Under the protective blanket of local security and the necessary services informal markets provide, the markets are alive and healthy.
- The markets have become a source of income relied upon by a large majority of individuals.
- Smuggling or participating in the informal market is well accepted by a large enough number of people.

Table 4.3 Findings and conclusions for DPRK national government

Findings
<ul style="list-style-type: none"> • In response to the 2006 North Korean Missile and Nuclear Tests on July 5, the South Korean National Assembly decreased government spending on inter-Korean cooperation projects from 650 billion won to 500 billion won. • On July 12, 2008, a South Korean tourist who walked into a restricted zone at Mt. Geumgang was shot and killed by a Korean People's Army (KPA) soldier. Since this incident, all tourism to Mt. Geumgang has been suspended. • On January 30, 2009 North Korea officially "nullified" all past inter-Korean agreements. • In 2009, in the last Six-Party Talks, DPRK walked out and said they would never come back • On November 10, 2009, the South Korean Navy ship Chamsuri-336 exchanged fire with a North Korean patrol boat near the Northern Limit Line (NLL). • On March 26, 2010, a South Korean corvette, the <i>Cheonan</i>, sank after an explosion where 46 South Korean navy seamen died. An international Joint Investigation Group released an interim report that stated that the <i>Cheonan</i> was sunk by a torpedo from a North Korean submarine. • On November 23, 2010, the Korean People's Army fired artillery shells at one of the ROK islands, Yeonpyeong Island, killing 2 ROK marines and 2 civilians. The ROK fired in returned about 80 shells. • In response to the U.S. and ROK joint naval exercises, Pyongyang accused the training as an attempt to ignite a new war on the Korean Peninsula. • Pyongyang rebuffed President Lee's of South Korea invitation to the March 2010 Nuclear Security Summit in Seoul. • One of North Korea's arguments is that agreeing to denuclearize is an attempt to disarm the DPRK in preparation for an invasion from South Korea with the US. • Over the past years it has attempted to quash the decentralized, market-conforming cross-border exchange that has grown up over the past 20 years and also to promote relations via entities that are more tightly controlled by the central authorities. • Despite Chinese pressure, North Korea has refused to adopt economic reforms. • North Korea has maintained its nuclear program. • Storm Trooper Units in North Hamkyung Province sent to crackdown on "smuggling" demanded bribes and traded with the smugglers at the end of their deployment. • The Storm Trooper Units sent have the right to shoot anyone on sight and are reputed as the most loyal troops to the Kim royal family. • "Juche" ideology, DPRK's national ideology, has the ultimate goal of eliminating all dependence upon other countries in all aspects. • All revenue collected through the government is first sent to Kim Jong Il's personal finances, the leftover goes to the DPRK government.
Conclusions
<ul style="list-style-type: none"> • Pyongyang desires total state control over the economy. • Pyongyang's nuclear program has continued to develop despite years of diplomacy. • DPRK is not afraid to openly conduct nuclear and ballistic missile tests, nor afraid to fire weapons at South Korea. • The central government is unable to collect and utilize revenue from the informal markets. • Despite its juche ideology, it has grown increasingly dependent on its relationship with China. • North Korea is growing increasingly dependent upon China in security and economical aspects. • Pyongyang has no intention of stopping its nuclear program through diplomacy. • DPRK has repeatedly attempted to limit and eradicate the informal markets.

4.2.4 U.S. National Government

The stakeholder assessment of the U.S. national government was drawn from various expert opinions and news articles reporting on state envoys and public comments made. Official statements made by the U.S. Department of State (2011) were also used.

Table 4.4 Findings, conclusions and recommendations matrix for U.S.

Findings
<ul style="list-style-type: none"> • North Korea is violating UN Security Council Resolution 1718 with their missile tests. • U.S. does not want North Korea to launch their satellite or missile because it is a provocative act. • Defying a UN Security Council resolution will lead to consequence. • Resumption of Six-Party Talks with the goal of verifiable denuclearization. • All decisions will be made through the UN Security Council. • The international community does not like North Korea's satellite launch. • A satellite launch would advance North Korean capabilities in a way that would prove provocative and destabilizing. • The Six-Party Talks must be at the center and forefront of our efforts to deal with the issues of North Korea. • The goal of the United States and our allies and partners remains a stable, peaceful Korean Peninsula free of nuclear weapons. • To achieve this goal, the United States intends to maintain strong solidarity with South Korea, Japan, and other states with a vested interest in the future of the Korean Peninsula and the stability and prosperity of Northeast Asia. • The U.S. continues to encourage the DPRK to engage in meaningful negotiations on denuclearization and to honor its commitments and international obligations. • At the same time, the U.S. will work to ensure the implementation of U.S. and international sanctions against North Korea's nuclear, missile, and proliferation networks and its involvement in other illicit activities. • If North Korea improves relations with South Korea and demonstrates a change in behavior, including taking irreversible steps to denuclearize, complying with international law, and ceasing provocative behavior, the United States will stand ready to move toward normalization of our relationship. • Human rights are a top U.S. priority and an addressing of human rights issues by the DPRK will have a significant impact on the prospect for closer U.S.-DPRK ties. • During the January 2011 China state visit, President Obama emphasized to President Hu that North Korea's nuclear and ballistic missile programs are increasingly a direct threat to the security of the United States and our allies. • The President underscored the need for China to leverage its unique relationship with North Korea to compel Pyongyang to abide by its commitment to the 2005 Joint Statement of the Six-Party Talks as well as its obligations under UNSCR 1718 and 1874. • 2008, U.S. removes North Korea from the State Sponsors of Terrorism list.
Conclusions
<ul style="list-style-type: none"> • The U.S. first and foremost does not want a North Korea with nuclear weapons. • The U.S. is committed to the defense and safety of South Korea. • The U.S. prefers to make policy towards North Korea through the UN Security Council. • The U.S. values human rights as well as humanitarian conditions. • The U.S. can project military power after North Korean provocations. • The U.S. is willing to normalize relations with North Korea. • The U.S. sees Sino-DPRK ties as an important part of DPRK diplomacy.
Recommendations
<ul style="list-style-type: none"> • The disarmament of nuclear weapons development in North Korea is the main objective. • The U.S. can respond to North Korean provocations through military demonstrations and economic sanctions through the blessing of the UN. • The U.S. recognizes that China plays a key role in influencing Pyongyang.

4.3 Systemigram

After conducting a stakeholder analysis, key findings and relationships were identified to help create the main nodes of the Systemigram. A Systemigram graphically represents the relationships in a complex system. It is a network consisting of nodes and links that depict how the systems' elements affect one another. It is not a linear cause-effect diagram but rather an ecosystem in which the disruption of one element and how it ripples across the system can be easily illustrated (Lee, 2011). The full Sino-DPRK Systemigram is shown in Figure 4.1.

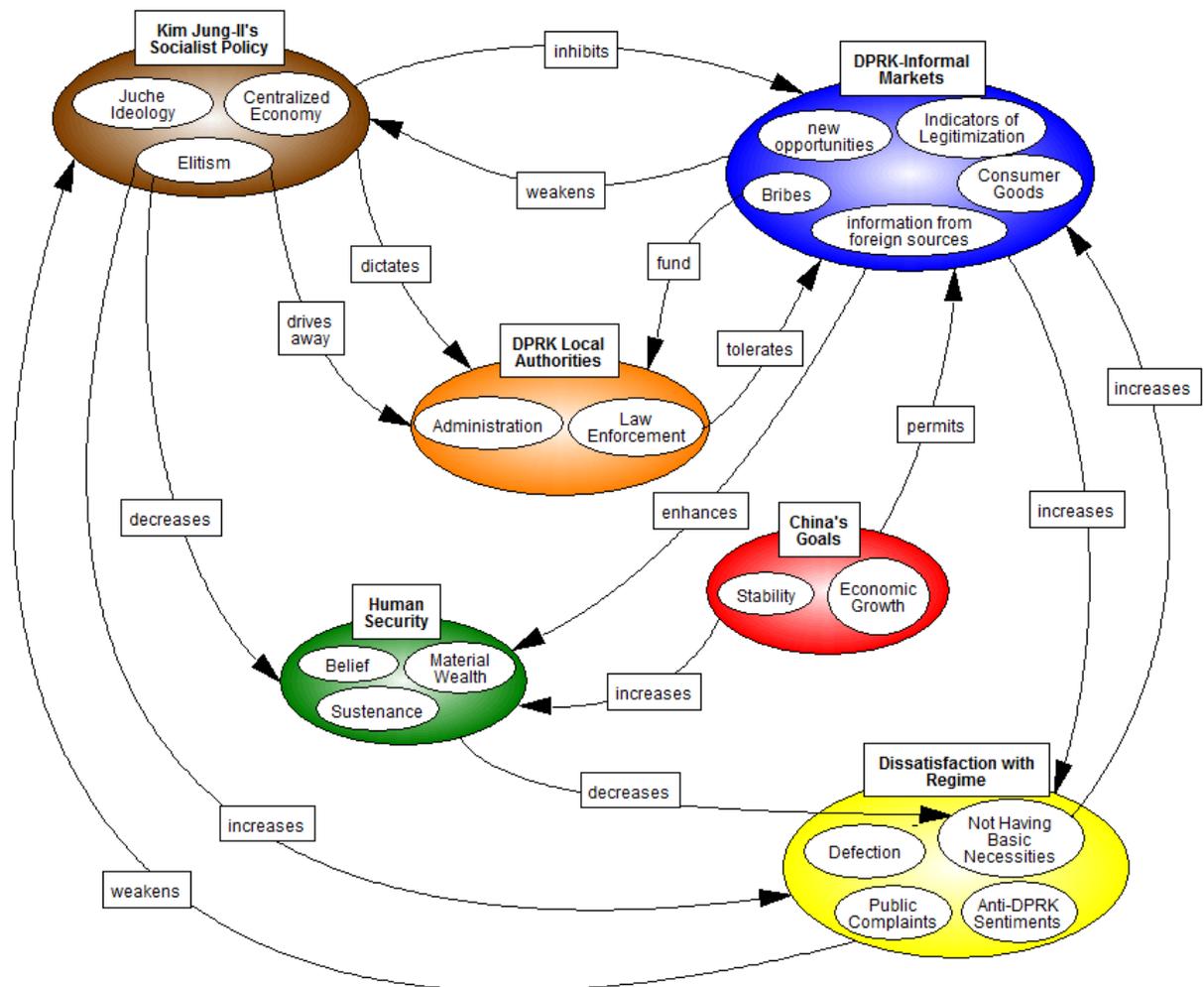


Figure 4.1 Sino-DPRK informal market Systemigram

4.3.1 China's Goals

China, as one of the primary stakeholders in the Sino-DPRK informal market relationship, wields a considerable amount of diplomatic influence over Pyongyang. Along with South Korea, China's own strategic vision and goals have the ability to alter the current strategic situation in the Korean peninsula. China has not labeled the movement of marketable products from its country into DPRK as smuggling. Rather, China has not paid attention to it at all, signaling that the authorities are allowing these sales to happen.

Within the "China Goals" node are the sub nodes "Stability" and "National Economic Growth." These are China's main goals for the development of its country. In order to maintain the status quo, China needs to ensure that North Korea remains in its current state. One way is to increase the level of human security for the North Korean people and that occurs through a bilateral economic partnership and by providing a security blanket.

4.3.2 DPRK Informal Markets

The relationships of the Sino-DPRK informal markets are the centerpiece of this project with the goal to be able to accurately depict and measure the different effects that arise from or affect these markets.

The markets provide their customers with consumer goods that include food and man-made products like clothes, toys, and appliances, as well as job opportunities especially for women who turn to these markets to help their families and are increasingly becoming the main breadwinner, and information from foreign countries. The latter is important because news and information is tightly controlled within DPRK and western media is illegal in the country. Reading or hearing foreign news provides North Koreans with a different perspective aside from the regime's point of view.

These markets, which are illegal in North Korea, generate a large source of bribery revenue for government authorities. The use of bribes have become so mainstream that local security officials have come to depend on this revenue stream as opposed to the salary provided by the national government.

One way to measure the maturity of the markets would be to observe its indicators of legitimacy that includes common functions of the modern financial structure like credit, legalization, banking, and investment.

The existences of these markets, which are based on the principles of free market, go against the socialist economic policies of the Kim regime. Not only does their very being undermine the legitimacy of the government, it increases dissatisfaction among the people who see that the policies of the central government as failing. Yet, the markets provide much needed food and other necessary objects to their consumers. By having access to these goods, the human security level of the people increase that helps appease their dissent against the Kim regime.

4.3.3 Kim Jung-Il's Socialist Policy

Any sort of analysis of the markets would be insufficient without understanding the current law of the country. The centralized economic policy of DPRK follows the principles of Marxist-Lenin where the government rations out everything from food to clothes to medical care and the heart of the economy centers around separate farming collectivists. In addition, "juche"⁹ ideology, which demands a state be completely self-reliant, dominates the decision-making of DPRK policy.

Rather than distributing the country's resources evenly, the Kim family has favored the elites and the military, who are the first to receive anything after the royal family. No matter how powerful the dictator, Kim must appease the elites of the country to ensure that the state runs smoothly enough. However, this policy of elitism creates problems for those who are not as fortunate. For example, the regular citizens, which include lower level government officials and authorities, of North Korea live in destitute poverty and find themselves turning to the informal markets for support and survivability.

All power in the country lies within the hands of Kim Jung-Il¹⁰. Local government and institutions serve as vehicles of executing national law.

4.3.4 DPRK Local Authorities

Despite the central government's best efforts, its lack of resources and a poor infrastructure gives local authorities plenty of wiggle room. Although power is supposed to be centralized, the large difference in legal treatment and attitudes towards the informal markets warrants that the local authorities are treated as a separate entity. Rather than extinguishing or limiting the informal markets, local authorities and security forces have thrived alongside the growing markets. Crackdowns on informal traders and merchants must come from national units under direct orders from Pyongyang. This stems from the fact that the national government does not provide enough resources or incentives for the local governments to carry out national policy, so this phenomenon may be situational and tentative.

⁹ The Juche ideology is a political thesis of Kim Il-sung, the founder of the DPRK.

¹⁰ When we started this research Kim Jung IL was still the "supreme leader" of North Korea. When his son, Kim Jung-un succeeded his father on 28 December 2011, we are assuming that he will continue his father's totalitarian regime.

Both the national government and the people under the authority of the local government compete for its support. Although Pyongyang dictates policy for the local authorities to follow, they usually tolerate the informal markets instead. By supporting the markets, the level of human security increases which garners support for the localities to maintain their current behavior and attitude.

4.3.5 Human Security

The most basic, consistent, and accurate measurement of a populace's satisfaction with their current government is their level of human security, which I defined as the level of available sustenance, material wealth, and belief in the conditions of the future. In other words, a person's standard of living and level of fear of surviving in the immediate or long-term future define the term "human security."

Ever since the collapse of Soviet Russia and the famine during the 90's, Pyongyang has failed to deliver on their promises of providing for its people. Continually so, its policies of favoring the elites and the military lead to situations in which the people can no longer depend on their government to survive. On the other hand, any increase in the level of human security tells people that they can survive within the current system. It creates a sense of appeasement in people that allows them to tolerate the system.

The level of human security in North Korea has been improving through the concentrated efforts of China and through the informal markets, which are providing the people with what they need and want.

4.3.6 Dissatisfaction with Regime

A common measurement to judge the health of a government is by looking at the approval ratings of the people. In this node, I arbitrarily chose the term "dissatisfaction" as opposed to "satisfaction." Dissatisfaction in North Korea can be shown in several ways to include defection, public complaints, personal anti-DPRK sentiments, and whenever people are starving or dying, they will always attribute some blame to the government. Any form or measure of dissatisfaction is an automatic blow to the legitimacy and support of the Kim regime. However, whenever people are able to survive and live their life, their anger towards the government lessens a minor amount.

Frustrated with the failures of central authority, people tend to turn towards illegal activities. By participating in the markets, the people are showing their discontent with the government's public distribution system and their faith in the ability of the government to provide for them. In addition, information from foreign news sources can be acquired through the markets. Learning and seeing North Korea through a different perspective aside from the government also helps contribute to discontent. Furthermore, by comparing how people react to elitist policies in the rest of the world, Pyongyang's elitist policies definitely alienate and upset the rest of the population.

4.4 Functional Analysis and Value Hierarchy

Using the material developed through the stakeholders, literature review, and Systemigram, functional hierarchies for the indicators of market survivability and capacity for growth were created. Functional hierarchies identify the system function and sub functions. They also guide concept development, design, and help identify performance measures (Parnell et al, 2011). The fundamental objective of DPRK is "Remove or Stunt the Expanding Informal Markets" as well as its subsequent four functions were developed using the information gathered through the Systemigram and stakeholder analysis. The rationale for choosing this objective was the need to first comprehend the capabilities of the DPRK government. Before we can predict the effectiveness of our own policies, we first need to know what the limits of the other side are. Also, many believe that pushing North Korea towards reforms can best be accomplished not through sanctions but through transformations of the people and the economy. Those, the functional hierarchy presented could just as easily be modified to promote the expansion of informal markets.

The four functions: reform the economy, improve law enforcement, cooperate with China, and provide for the people are then defined by their own objectives which indicate success of the abovementioned

functions. These objectives are finally measured and evaluated by value measures which are specific, quantifiable units of measure.

In order to assess a system quantitatively, a qualitative model such as this is required to authenticate what exactly needs to or should be measured. The data specified in the value measures will then be gathered up and evaluated to verify the best solution.

The functional hierarchy would ultimately lead to a value model complete with swing-weight matrices and optimized decisions. However, this paper only attempts to introduce and explain systems-thinking tools to apply towards the field of international relations. One tool to analyze decisions for and towards international and state-level systems is through the method of functional analysis and value modeling. It objectively prevents “silo-ing” and allows the problem to be analyzed holistically.

Figure 4.2 depicts the fundamental objective and its four main subsequent functions.

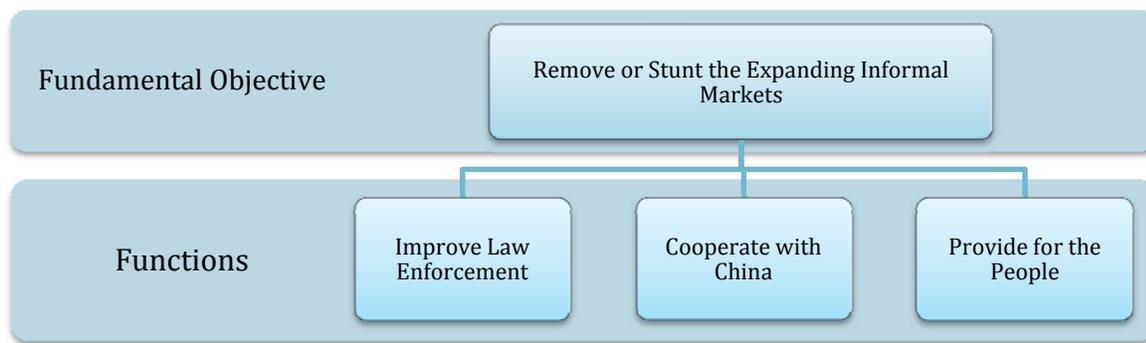


Figure 4.2 Top-Level functional hierarchy

The objectives and value measures of their respective functions corresponding to Figure 4.2 are discussed below. Due to the sheer scope of factors that contribute to the functions of “improve law enforcement,” “cooperate with China,” and “provide for the people,” the objectives associated with the functions are not all-inclusive. There are many more objectives that affect these functions but only basic examples will be listed.

4.4.1 Improve Law Enforcement

As shown in Figure 4.3, to improve law enforcement, is the function that most governments use to combat illegal business operations within their borders. North Korea is no exception. Pyongyang has sent multiple national-level sweeps at an attempt in removing or dissuading the population from participating in the informal markets. Several functional objectives that may improve law enforcement are illustrated.

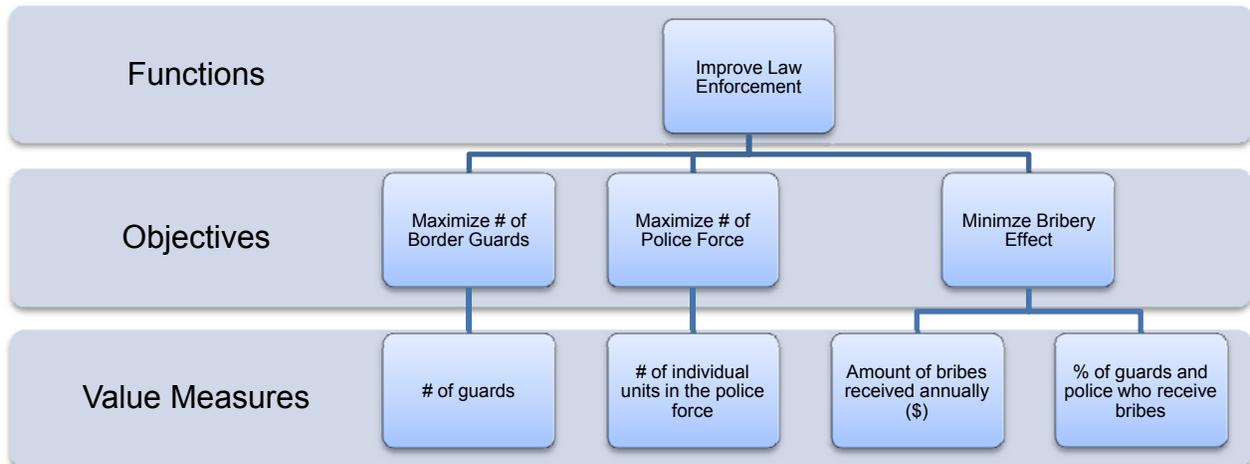


Figure 4.3 Improve law enforcement function

- **Border Guards** – As the number of border guards in a country increases, so does the country's concern about border issues. A large number of border guards indicate that the country is trying very strongly to control its border. In North Korea, the border guards are assumed to prevent smuggling and illegal migration.
- **Police Force** – While the border guards patrol the border for illegal activity, the police force patrols the streets of the city. A large police presence would signify the extent of control the government is trying to exercise over the population. Since the markets are an illegal activity, the individuals in the police force would be assumed to be looking out for signs of these activities and putting a stop to it.
- **Bribery Effect** – Law enforcement units are useless if they do not perform their intended duties. Bribery is a large issue that the North Korean government has to deal with. North Korean refugees who were interviewed claimed upwards of 80% of those who engaged in market activities paid bribes (Haggard, 2011). If the percentage number of law enforcement units who accept bribes could be uncovered, the actual capabilities of the force would be better understood.

4.4.2 Cooperate with China

Figure 4.4 shows the functional hierarchy for the cooperate with China function. The first sub function addresses border smuggling. The relatively porous border between North Korea and China is at the fault of both countries. Without similar attitudes towards the border issue, the boundary will remain open to smugglers and illegal migration. A common trend in refugee testimony is that the North Korean border guards are easy to bribe and get through. However, little to none is mentioned about dealing with Chinese border guards. The Chinese may be turning a blind eye to this phenomenon and doing just enough to appease their unruly neighbors. The functions supporting provide for the people are shown in Figure 4.5.

- **Cross-Border Smuggling** – The Sino-DPRK informal markets goes both ways. Goods are smuggled into as well as out of China. However, most of the goods are wholesaled from China and sold at retail prices in North Korea (Park, 2011). Knowing the dollar amount of goods that are exchanged on a monthly basis as well as the number of smugglers is a good indicator of how much resources China is willing to contribute to the issue.
- **Chinese-side Merchants** – Smuggling out of or into DPRK would fail without accomplices from China. Although, most of these accomplices are widely believed to be ethnic Koreans, a concrete number would illustrate a picture of how large and widespread these operations actually extend to.
- **Chinese Anti-Smuggling Capabilities** – The Chinese are in harmony with their North Korean brethren in the smuggling issue in that they are both strongly against drug and human trafficking,

as well as on the issue of DPRK refugees. The degree to how the law of both countries match with regards to smuggling as well as the amount of tangible resources China has dedicated to this issue such as anti-smuggling agents will assist in determining China's perspective and willingness to help DPRK on their illegal trading issue.

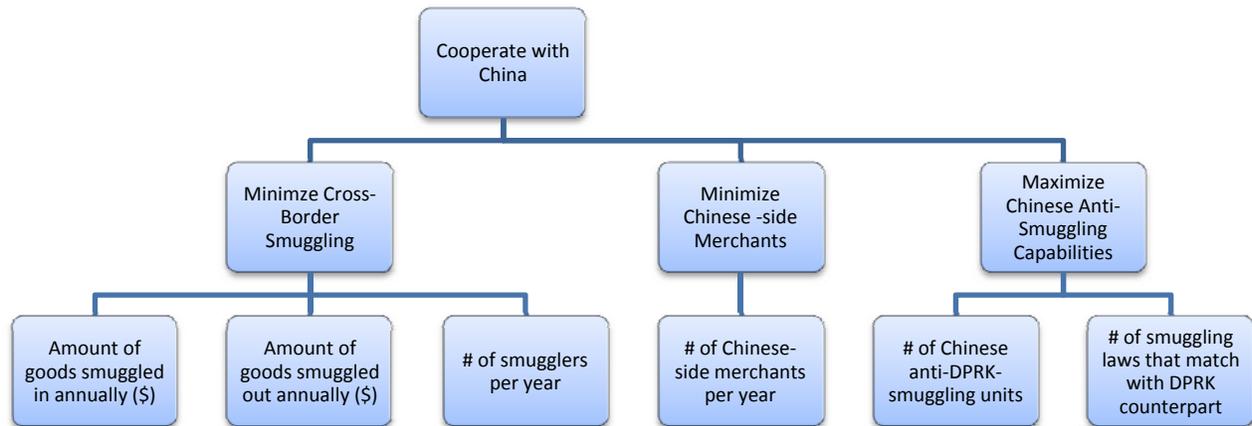


Figure 4.4 Cooperate with China function

4.4.3 Provide for the People

Figure 4.5 shows the functional hierarchy for providing for the people. One of DPRK's weakest sociopolitical links is their inability to provide for all their citizens through their public distribution system (PDS). Despite touting their centralized economy as fair and utopian, refugee surveys show that around 40 percent of the respondents come to rely entirely on the market for food (Haggard, 2011). The famine of the 90's is the primary reason why North Koreans first turned to the informal markets. It served as a survival mechanism. The famine has now passed over and the country has been free of any major economic crisis aside from the most recent massive currency devaluation, yet the informal market system is as strong as ever.

- **Goods Provided Through the PDS** – A public distribution system that rations out everything from food to clothes-stuff to its people is a hallmark of any hardline socialist economy. Respondents from refugee surveys indicate that less than 5 percent reported the PDS as the primary supplier (Haggard, 2011). As long as PDS continues to remain unreliable, people will turn to other mechanisms for survival.
- **State Provided Salary** – Every male in North Korea is employed and receives a state salary. Yet the funds are distributed unevenly among the different social classes. Apart from the elites, the average North Korean's monthly salary is nowhere near enough a survivable level (Lankov, 2005). In addition, the purchasing power of a North Korean won needs to be considered.
- **Work Efficiency** – Although every male is employed, many realize that the state-sponsored job will not help their family survive to the next quarter. As a result, many of them do not show up to work to participate in the more lucrative market activities.
- **Budget for Socialist Programs** – All funds acquired in North Korea first go to the Kim royal family. Leftover funds then trickle down to the city elites and finally down to the bottom dwellers. For example, the PDS continues to provide the same service to the city elites as during its heyday, a sharp contrast to the lack of services they provide for the majority of the population located in the countryside. Finally, experts widely believe that most the national budget is funneled into military activities and the nuclear program. There is no known exact dollar amount because North Korea does not provide an open-sourced budget.

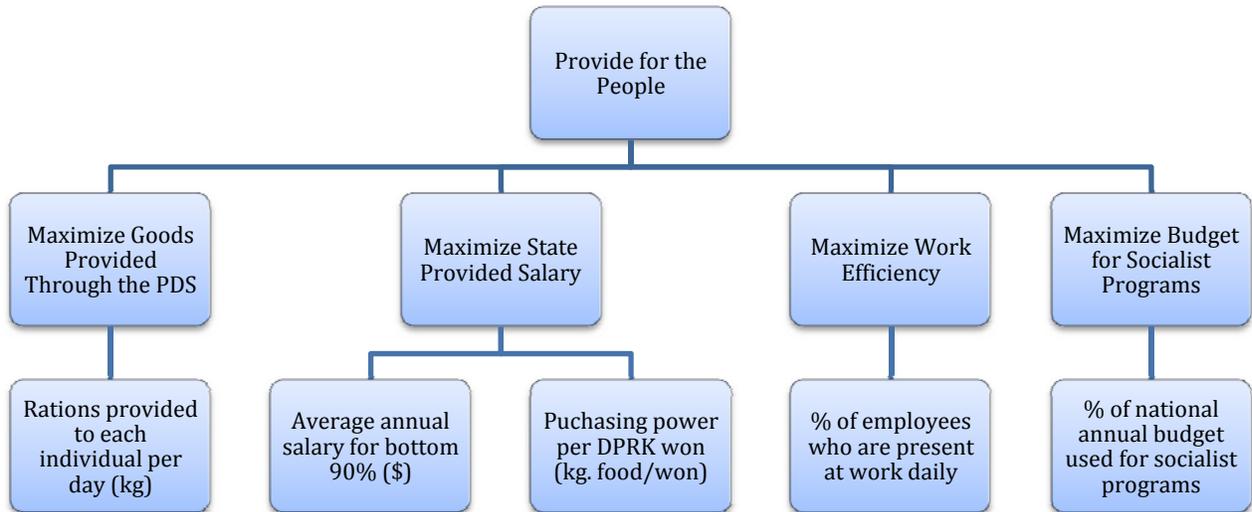


Figure 4.5 Provide for the people function

5. Complex Systems Diagramming

5.1 Swim Lane Chart Results

Figure 5.1 is an example of a simple, conceptual decision tree for two outcomes with respect to the North Korean economy; whether the country reforms for free market principles or not using swim lanes representations. A swim lane chart is used to illustrate how multiple inputs simultaneously affect multiple variables. Swim lane charts are generally used in businesses to illustrate process flow diagrams, or flowcharts. The objective of the swim lane chart is to visually distinguish responsibilities for the different processes within a certain business process. As a stimulus moves along a certain business process, different areas and functions of the business will be responsible for the stimulus at different times of the process. The chart makes it visually clear and aids in streamlining business processes or determining bottlenecks.

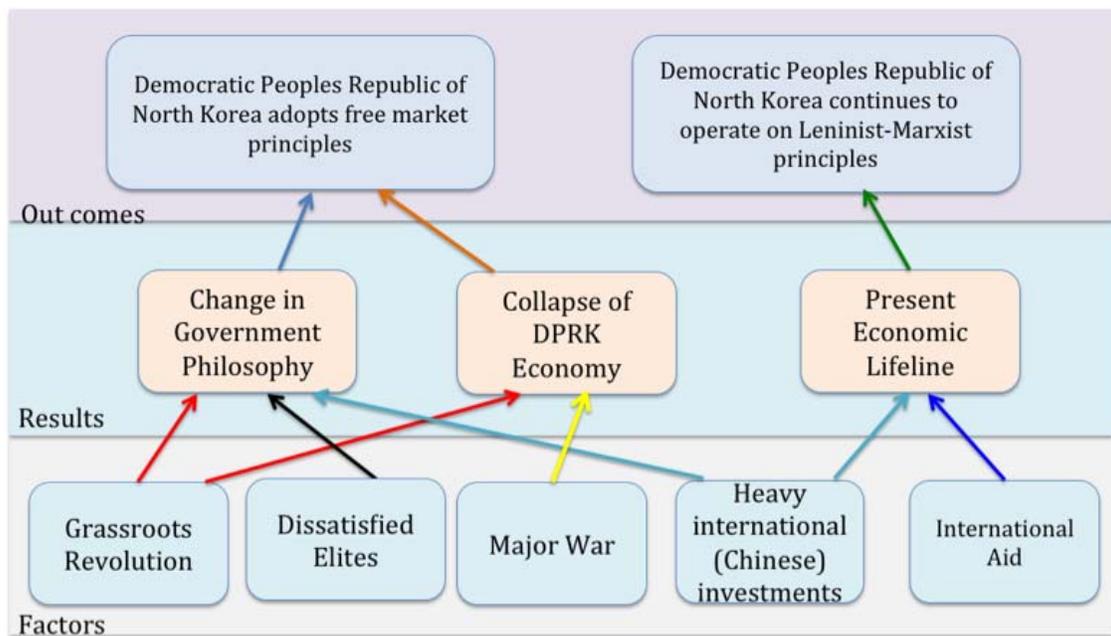


Figure 5.1 Market reform decision tree

Figure 5.2 contains a simple flow diagram or a normal business swim lane chart is that it highlights the competition between opposing actions in affecting the outcome. The diagram is best used as a visual tool to communicate the problem with stakeholders. Figure 5.2 demonstrates actions that promote democratic reform in North Korea and actions that hinder them. Looking at U.S. policy, you can see that there is a conflict because our current policies both promote and hinder democratic reform. We want to promote the outcomes of an informed society, growth, responsible governance, a wealthy society, and regional stability, yet we employ sanctions and isolate the state. Although we also try to negotiate with Pyongyang and the regional stakeholders, these different policies often clash and mitigate one another.

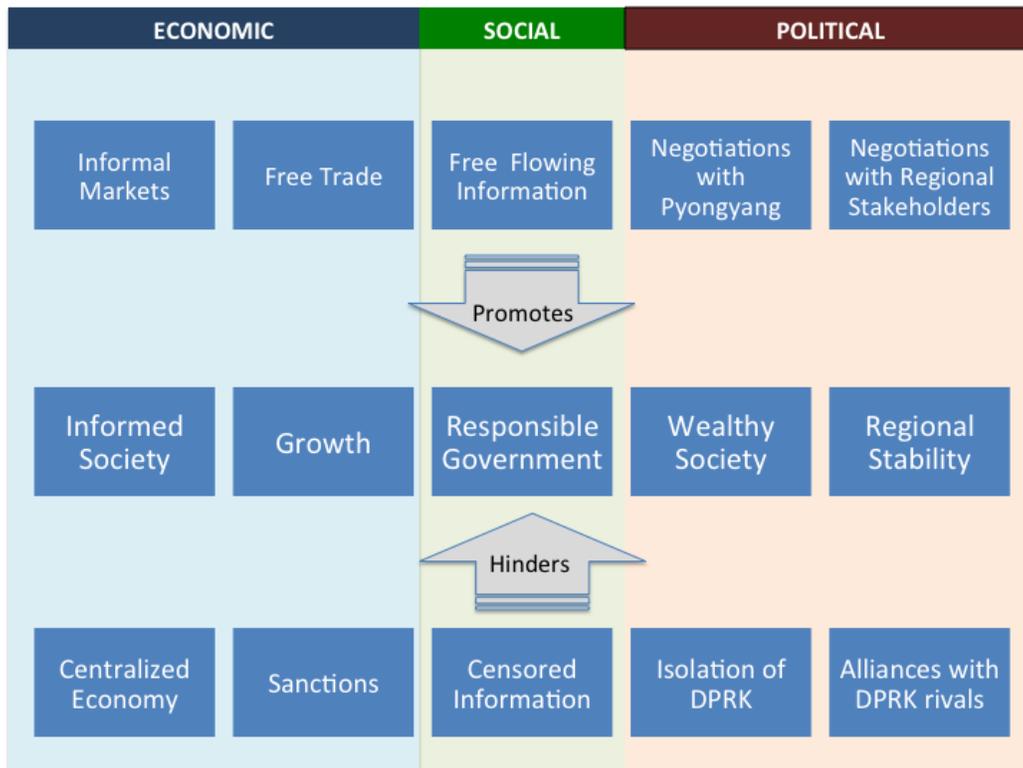


Figure 5.2 Swim lane chart

In Figure 5.2, the different lanes have been assigned different stages of a decision-making process: outcomes, results, and factors. Factors are chance events or stimuli that encourage change or at least a reaction. In this example, the 5 different stimuli of the system have been identified as grassroots revolution, dissatisfied elites, major war, heavy international investments, and international aid. This list is by no means exhaustive but rather used as a starting point for future research.

- **Grassroots Revolution** – For a long time, many experts and state officials have been expecting a revolution among the population to occur. The population is starving, malnourished, living in poverty with few material goods, and stifled intellectually. Although this has yet to happen, many hoped that the Arab Spring would have encouraged states suffering under the rule of one to also take to the streets. In any state, a revolution warrants a response from the government, whether it is for better or worse.
- **Dissatisfied Elites** – Even Kim Jung-Il would not remain in power if his elite support base crumbled. Insofar, he has been able to maintain their support by adopting an elitist policy. The nobles who live in Pyongyang have the choice cuts from the state’s revenue, administration, and distribution services. Although some of the upper-class has become refugees due to strong political views, the majority remains complacent and happy with their situation.
- **Major War** – The First Korean War changed the Korean peninsula for the next couple decades. The country of Korea split into North and South with polar governments. Fast forward to the present, the South leads the North in all aspects from population to economy to military spending. However, the North has continued to provoke not only their southern neighbor but also the international community with nuclear belligerence and border provocations. When enough is finally enough, the peninsula will be shaken up again.
- **Heavy International (Chinese) Investments** – China has become North Korea’s greatest trading partner. At its current trend, North Korea may soon find itself an economical indentured servant to the wishes of China.

- **International Aid** – This is a controversial theme in dealings with North Korea. The aid seldom reaches its intended consumers and is often funneled to the Kim royalty and Pyongyang elites. This translates the aid into fuel for the Kim regime and everything else it stands for to include producing a nuclear threat to America and the continual denying of basic human liberties to the North Koreans.

Factors leads to decisions and the decisions lead to consequences. Decisions are affected by the factors present in the decision-makers environment.

- **Change in Government Philosophy** – The direction of the government will change when revolution, sufficient elite dissatisfaction, or enough international influence occurs. All of the listed factors above are transformational for the government. In its essence, the direction of the government is dictated by whoever has the most power, when that person or his mentality changes, so will the state.
- **Collapse of DPRK Economy** – The DPRK economy will collapse in the event of a revolution or a major war outbreak. Both of these events imply anarchy within the state or a paradigm shift in daily activities for the common man. They will cause havoc and chaos for the supply and demand of goods which will lead to inflation and ungodly prices.
- **Present Economic Lifeline** – The economic lifeline of DPRK will remain as long as international investments and aid remain. In the modern era, no state can be self-sufficient and expect to live with a high level of material wealth. The sheer number of populations dictates it so. North Korea is no exception and as long as aid arrives or China remains a source of economic goodwill, the existing DPRK economical system will manage to survive.

Finally, after the results come the outcomes. There are two outcomes in the decision tree presented. One is the desired outcome and the other is the status quo. The goal is to reform the North Korean economy so that status quo would be for the government to maintain their current system. As long as DPRK has a viable economic lifeline, they have no urgency to change. Despite all the sanctions and embargoes America has placed on that state, the elites do not suffer. Time and time again, the facts show that the common people suffer and starve.

5.2 Causal Loops Diagram

Causal loops and diagrams attempt to show causation among different events and phenomenon in the context of its defined system. The scope of the system can be as large or as small as the artist wants it to be. When reading causal loops, the direction of the arrow indicates the effect; where the arrow came from indicates the causal relationship. A positive sign means that as the cause increases, so does the effect, or a positive causation. A negative sign means that as the cause decreases, the effect increases, or a negative causation. Although there are many similarities to correlation, causal loops are different in that they attempt to find the underlying reasons. In addition, the arrows are irreversible. Unlike correlations where one value increases along with another, the effect only occurs because of the cause. Figure 5.3 below is the causal loop diagram for the informal market system in DPRK.

Similar to the decision tree and swim lane charts, the scope of the causal loop diagram depends on the creator and the level of sophistication or the scope of the problem he wants to analyze. The figure above is quite exhaustive and includes even international effects on the market system. Looking at Figure 5.3, there is no start or end point. Due to the immense scope of the system, finding a start point or a primary catalyst to initiate the system process is impossible. The lack of these end points highlights the fact that international and domestic systems are open systems. Multiple factors often occur and its consequences compound resulting in an eventual event.

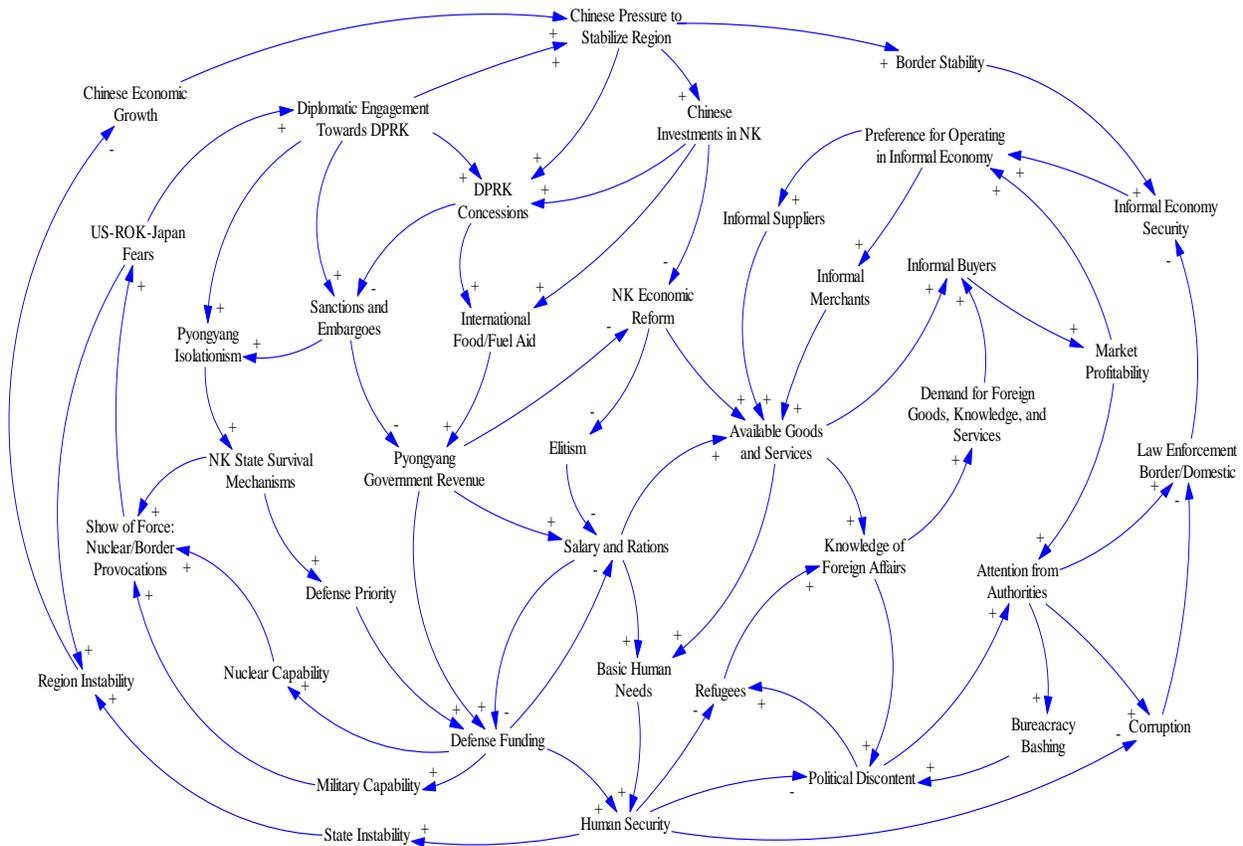


Figure 5.3 Market causal loop diagram

5.2.1 Clarification of Terms

The list below consists of the terms that may be confusing, ambiguous, or contradictory. Thorough understanding of the terms chosen is critical to understanding the dynamics of the system.

DPRK Economic Reform

The economic policy of Pyongyang is currently Leninist-Marxist socialism. The economy is centralized and individuals work for the betterment of the state and the spirit of the individual as opposed to monetary benefits. However, if the state prospers and continues to receive revenue, that result becomes a sign that the current economic policy is working and that there is no reason to change it. Socialist policy also encourages elitism. Despite communism and socialism's utopian theory of universal equality, time and time again, the distribution of wealth is redistributed disproportionately in favor of the state's elites. If there was a strong promotion of free market values, the socialist economics of the country would be undermined. Furthermore, the North Korean economy has long been a target for outsiders to reform. Both the U.S. and China have an interest in changing the DPRK economy. Figure 5.2 illustrates the different factors that play into it and how to better refocus our efforts in achieving reform.

Elitism

Elitism is the biased favoring of society's elites. In the case of North Korea, elites receive the most rations and goods from the state distribution system. They are also placed at the upper echelons of state run trading companies and lucrative government positions. Additionally, all the revenue earned by the state must first filter through the Kim's personal bank account. After he chooses his share of the revenue, the rest of the then funds trickle down to be distributed to the rest of the country. Not only do elites get an

unfair proportion of the distribution as well as choice decisions, but Kim will also set aside some of his personal finances to buy support from the elites in order to keep them happy.

Salary and Rations

Every North Korean receives a salary and a ration from the government through the PDS. Yet as mentioned above, the quantity is affected by the actions taken by the elites. Furthermore, the needs of the state come before the people. When defense priority arises, the state will lower the amount of goods the common person receives. However, the privilege of receiving higher pay and rations held by the elites are only touched in dire circumstances. When people do receive higher wages and have more food to eat, their general health, welfare, and survivability increases. This follows the fundamental laws of economics. An unexpected event that has occurred, however, is that people are taking their rations to the market to be sold and bartered. The unofficial reported number indicates that as the markets have become more and more commonplace, the number of individuals hawking their own state sponsored rations has increased (Haggard, 2011). This is because people can receive rations that they do not want or need and will trade their own in order to acquire something more pressing and relevant to their situation.

Law Enforcement Border/Domestic

Law enforcement plays the role as the primary regulator of the markets. In America, the regulators are the legislations and regulations imposed upon by the U.S. government. Laws and regulations also dictate the economy in North Korea but they are largely unheeded to within the scope of the markets. Otherwise, these markets would not exist. Although the police and border guards are legally bound to shut down these markets, they have become reliant upon the bribes they receive from the informal merchants. Corruption has become a serious problem for these guards to carry out their original missions. An important distinction to note is that law enforcement does not necessarily rely upon the number of the personnel working. Periodically, Pyongyang will direct special attention to these markets and increase law enforcement activity by dispatching “elite” units to sweep the area of all illicit market activity (Young, 2011). Ironically, the more attention the merchants are receiving from the government, the more corruption is around. Due to the reliance upon the markets for survival for not only the merchants but also the customers, there is a large pressure to protect and maintain the markets.

Informal Economy Security

Economy security is defined as the ability and tendency for the business to survive and thrive without being shutdown not from a lack of revenue, but from strict government scrutiny or other external factors, like mafia activity. Informal economy security is similar but with the focus on informal markets instead of legitimate state-forms approved by the government. We must always understand that the free market does not operate openly in North Korea. Furthermore, the principles of economics are based on the laws of supply and demand. When demand increases, there are more opportunities for sellers to enter the market and make a profit. The total supply of market goods increases when the number of suppliers increases. The suppliers are generally ethnic North Koreans who live across the border in China. They function as wholesalers who sell to the individual merchants in DPRK. However, domestically, more and more North Korean peoples are taking their rations and selling them to the market. When economy security is high, these market principles tend to dominate.

Show of Force: Nuclear/Border Provocations

The headlines that have reached America regarding North Korea in the past two decades have been weaponized nuclear threats and cross-border attacks regarding South Korea. Although they are two different actions, I have grouped them together as a show of force. Time and time again, North Korea has excelled at brinkmanship, or acting as irrational beings in order to scare others to giving in at negotiations (Ha, 2010). It is important to understand that these two forms of provocations are meant to create international fear and not actually a precursor to an impending invasion. These provocations are spurred on by the capabilities of both the nuclear department and the military, which I have depicted as reliant upon the amount of funding received. They can also be reactionary. With the prior success

experienced by Pyongyang using this tactic in acquiring needed provisions and fuel, the utilization of this technique will only continue.

State Survival Mechanisms

At the very core of every state is the want for it to survive. The different mechanisms a state can employ include war, diplomacy, joining an alliance, initiating a draft, or stealing from its own peoples. The activation of these mechanisms is based upon how secure the state feels. A state feels less secure when it is being isolated by the international community or experiencing defensive measures being set up against it. One of the most publicized survival mechanisms carried out by North Korea is the build-up of the military, procurement of nuclear weapons, and the use of brinksmanship.

In addition to the aforementioned mechanisms, one that has gained particular importance is establishing legitimacy of the government. Legitimacy of the government is important not only in domestic terms but also in foreign policy. States that are recognized by other states enjoy more privileges and more diplomatic dialogue than those that do not. Legitimacy also allows a state to function by maintaining order within its own borders. Legitimacy can be promoted through propaganda, popular actions, and military or political victories that appeal to the general populace.

Pyongyang Isolationism

Through U.S. efforts, UN sanctions, and Pyongyang's own bleak credit rating, North Korea has become more and more cut off from the international community. Even their closest allies, China, appear annoyed at them. Many states simply refuse to deal with North Korea because of their unpredictability and unreliability in conducting business and state affairs. An isolated state is like a cornered animal. Although cut off and alone, it can lash out violently instead of surrendering.

Market Profitability

Market profitability from Figure 5.2 refers to the collective revenue generated by market transactions. The underlying assumption is that the informal merchants are selling their products and services and making a profit. The more revenue is generated, the more prospective merchants appear. At the same time, more attention from local and national authorities is attracted because the money is not entering the state's coffers. Everyone wants a piece of the big pie.

Attention from Authorities

Initially, the informal markets operated with impunity because the scale was too small for legal authorities to bother about them too much. But as the market system grew and its operations became lucrative, it started to draw more and more notice. Since the law of the land is on the side of the officials, they can exhibit a large influence against the markets. In addition to the markets, political discontent also attracts ire from officials. In a repressed society like North Korea, the control of information is a key interest. Political discontent is commonly targeted and squashed in order to maintain favorable information about the government. When North Korean government authorities are involved, only two things happen: the law gets enforced or the law gets "adjusted" to fit the circumstance.

International Food/Fuel Aid

The purpose of delivering aid to another country is to improve the well-being and lives of its people because the assumption is that the receiving government's primary concern is to livelihood of its citizens. However, like most rogue nations, North Korea has diverted the aid away from the people and into the coffers of the government. Aid to North Korea has long been an issue for U.S. and South Korea alike because the intended targets of the aid, which are the starving people, usually do not receive the aid. The assumption in my model is that the aid goes directly to Pyongyang and is then treated as a source of revenue.

5.3 Loop Analysis – Lowering Number of Armed Provocations

Due to the complexity of the system and for the sake of simplicity, we analyzed one node and all of the critical loops it is part of in order to demonstrate how holistically seeing the entire system will lead to insights that would have otherwise been overlooked. The example chosen is one that leads to a great deal of concern for Washington and the rest of the world and it is North Korea's brash tendency to buck international pressure to disarm its nuclear program and its willingness to risk war by militarily engaging South Korea such as the Cheonan and Yeonpyeong Island incidents. One of the main objectives of this analysis is to determine not only the causes and effects of North Korea's brinksmanship but also to see whether a link with it to the informal markets exists, especially with the heavy focus I have made towards the markets earlier in the paper.

Although the paper has so far had a heavy informal market focus, trying to draw a conclusion between these black markets and whether they hold any strategic implications is still difficult to justify. Therefore, I have omitted any informal market effects and its implications for the purpose of helping the reader understand what kind of connections and insights a causal loop diagram can contribute to understanding the system and the problem.

5.3.1 Effects of Isolationism

The first three loops presented below all stem from the isolation of Pyongyang due to the concerted effects of the international community. Isolation is a result of fear and then breeds distrust among two or more parties. Of course, parties who distrust each other tend to not get along very well. In addition, actions directed against one another tend to be hostile and carry damaging effects. These loops demonstrate how the provocations lead to international fear which then causes a coordinated effort to punish the state. Due to that, the state then feels the need to up the ante and repeat the process because now it feels threatened.

Provocations as a Reaction

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Diplomatic Engagement Towards DPRK → Pyongyang Isolationism → **State Survival Mechanisms**

In this loop, the brinksmanship occurs due to the state's need to survive. Showing force demonstrates strength and power. Why North Korea feels the need to reactively demonstrate strength and power in order to survive will not be analyzed here but the reasons could include fear from being taken advantage of, fear from invasion, or the need to advance a certain type of interest in order to survive.

Provocations Due to Nuclear Capability

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Diplomatic Engagement Towards DPRK → Pyongyang Isolationism → North Korea State Survival Mechanisms → Defense Priority → Defense Funding → **Nuclear Capability**

This loop doesn't explain the reasons why Pyongyang insists on obtaining nuclear weapons but rather that it can only obtain them if it has the capability to. The capability stems from the amount of funds set aside for the program. Although throwing money at a problem does not guarantee better results, the general assumption is that increasing funding does allow for the acquisition of resources or skills not previously available; for example, uranium enrichment plants, knowledgeable scientists, more technologically advanced tools, and all the overhead costs required for the continuation of the nuclear program.

Provocations Due to Military Capability

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Diplomatic Engagement Towards DPRK → Pyongyang Isolationism → North Korea State Survival Mechanisms → Defense Priority → Defense Funding → **Military Capability**

The capability of the military follows the same logic as increasing nuclear capability above, more funding leads to an overall increase in the ability to use its military force to meet the demands of the state. Military capability is almost a direct translation of the number of soldiers and equipment. However, technology is also an important factor in determining capability.

5.3.2 Effects of Chinese Pressure

The next two loops are examples of Chinese influence on North Korea. Discussing North Korea without mentioning China is nearly impossible. With half of North Korea's economy tied to China and with that proportion steadily increasing, China will have more and more to say on how the state is run. China itself has a difficult goal of maintaining its high rate of economic growth while maintaining stability in the Korean peninsula.

China as a Lifeline

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Region Instability → Chinese Economic Growth → Chinese Pressure to Stabilize Region → Chinese Investments in DPRK → **International Food/Fuel Aid** → Pyongyang Government Revenue → Defense Funding → Military Capability

Despite the Six Party Talks, international pressure, and UN mandates, China has maintained the delivery of food, fuel, and energy aid to North Korea. The reason is due to the priority of keeping a stable region so that China can maintain its economic growth. As long as China continues to deliver aid to Pyongyang, the effect of the sanctions, embargoes, and withholding of aid to North Korea as envisioned by the U.S. will not achieve its potential effectiveness.

China as a Proponent of Reform

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Diplomatic Engagement Towards DPRK → Chinese Pressure to Stabilize Region → Chinese Investments in DPRK → **North Korea Economic Reform** → Elitism → Salary and Rations → Defense Funding → Nuclear Capability

On the other hand, North Korea has become economically dependent upon China due to its isolation from the rest of the world. China has also been steadily increasing its investments within North Korea especially in the realms of procuring natural resources. The more investments present, the more accountability and economic freedom China will demand from its neighbor. Since North Korea has no other country to turn to, the likelihood of fulfilling China's demands is greater than fulfilling any other demands from other countries.

China as a Mediator

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Diplomatic Engagement Towards DPRK → Chinese Pressure to Stabilize Region → Chinese Investments in DPRK → **DPRK Concessions** → International Food/Fuel Aid → Pyongyang Government Revenue → Defense Funding → Military Capability

Another role that is directly related to the reliance upon China by North Korea is that China can be viewed as the primary negotiator between North Korea and the rest of the Asian-Pacific countries. With all the leverage that China has, the DPRK is more likely to concede to China in order to maintain its last friendship. At the same time, Mr. Hwa, the Vice Chairman of the Chinese People's Political Consultative Conference has stated that the influence that China over North Korea is exaggerated and that North Korea is a belligerent state that does not listen.

5.3.3 The Multiple Effects of Sanctions

One of the primary tools used by the U.S. against North Korea to curb their unruly behavior is the enforcement of sanctions and embargoes. Sanctions have long been a tool wielded by our great trading nation against any state who poses hostilities against us to include Iran and Cuba. One of the reasons for why the U.S. was so successful against Iraq in the recent Iraq War was due to the long-standing sanctions that had wrecked complete havoc on the economy of the state. Despite its effects, there is little proof that the enforcement of sanctions is an effective diplomatic tool. Many of the countries that have sanctions against them have not changed their government or bent to the will of the U.S. for a few dozen years. Sanctions are widely regarded to have long-term implications as opposed to short-term effects. However, the question that weighs on everyone's mind is "how long?"

Sanctions Limiting the Development of Nuclear Capability

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Diplomatic Engagement Towards DPRK → Sanctions and Embargoes → Pyongyang Government Revenue → Defense Funding → **Nuclear Capability**

This loop shows the theoretical ideal situation for the U.S. rationale for enforcing sanctions against Pyongyang. The sanctions and embargoes would take away revenue from the central government which would then subsequently give them less funds to commit to their nuclear program. Yet, that is only one side of the coin. As I will show below, sanctions carry both intended and unintended effects that ripple throughout the entire country. One of the big caveats to the effectiveness of sanctions is that it is linked directly to the extent of how much the government cares about the material well-being of its people. Returning to the examples of Cuba, Iran, and North Korea, the central authority figure and organization of these states are well known to be well-fed and well-paid while the rest of the country wallow in squalor and live below the poverty line.

Sanctions Creating Social Problems

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Diplomatic Engagement Towards DPRK → Sanctions and Embargoes → Pyongyang Government Revenue → Salary and Rations → Basic Human Needs → **Human Security**

This string of events presented only consists of the beginning of over 70 different loops. The main idea to understand here is that sanctions not only create problems for the government, but it also creates problems for the people. When policy makers decide to impose sanctions, they inherently accept the risks and unintended effects of hurting the population instead of the government. They understand that the government will not immediately bend over and submit to the imposer. However, sanctions hurt the very root of all social problems which is the need for human security. Without it, social problems such as refugees crossing the border, corruption, and internal discontent occur and multiply. Furthermore, the entire state becomes unstable, contributing to the instability of the region.

Sanctions Reinforcing North Korea's Desire to Obtain Nuclear Weapons

- Show of Force: Nuclear/Border Provocations → US-ROK-Japan Fears → Diplomatic Engagement Towards DPRK → Sanctions and Embargoes → Pyongyang Isolationism → **North Korea State Survival Mechanisms**

The final loop presented demonstrates the dual-edged nature of sanctions. Although they were employed in an attempt to curb the development of nuclear weapons in North Korea, they are, simultaneously, justifying the need for the weapon in the eyes of Pyongyang. Sanctions, especially multi-lateral sanctions from multiple countries from which the U.S. has the upper hand in achieving, tend to make the targeted country feel isolated and weak. As demonstrated earlier, an isolated country can become a dangerous country and its state survival mechanisms will kick in.

5.4 Cause and Uses Tree and Other Informal Methods

The causal loop diagram in Figure 5.3 illustrates a highly complex system with multiple causes for one result. Oftentimes, there is a stream of events that trigger other events which then trigger even further events before finally reaching a conclusion. The beginning and end of the routes of causations are often difficult to determine. However, by limiting the cause and effects/uses of a certain event by two levels of nodes, you can see the immediate second and third order effects. This helps focus analysis and can serve as a starting point for future more in-depth examination of a certain issue. They also show the immediate order of events to better aid in problem visualization and analysis. For the policy-maker, these are short-term, quick, immediate fixes that can achieve instant results. Nonetheless, the natural order of progression will still continue and the progress will travel through the entire causal loop and time will show the unintended effects of the decision. Cause and uses trees have similar structures as flow diagrams and functional hierarchies. However, the trees emphasize causation as opposed to a methodical process or a group of subfunctions. Following the example above, we will show the cause and uses trees for the “show of force: nuclear provocations” event.

5.4.1 Causations of Armed Provocations

Figure 5.3 shows that nuclear and border provocations carried out by North Korea are directly caused by the military and nuclear capabilities of the state in addition to the threat level of extinction felt by the state. These can be classified as first-order causes because they are the immediate causes.

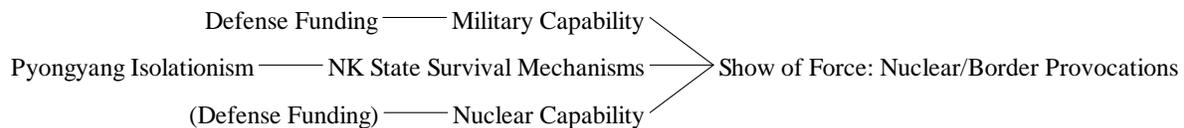


Figure 5.4 Causes tree

For policy-makers who want to create immediate changes, they can call for targeted military strikes that would strike military bases and nuclear facilities or negotiate for objectives that would lower troop levels, halt weaponized nuclear development, or the withdrawal of military forces to less-threatening areas. Targets that enhance military and nuclear capabilities are easy to identify and engage, but the state survival mechanisms are not. For as much as they are tangible, they are also very abstract.

Ultimately, a state will always have an option or one way or another to exercise its ability and instinct to survive, making this option not very feasible for policy makers. In situations like this, it is more helpful to look at the second-order causes, which in the case for survival mechanisms is the isolationism felt by the central government in Pyongyang. Policy which targets isolationism includes friendship policies that extend aid, information, and other signs of goodwill. Halting hostile acts like embargoes, sanctions, and public international denunciations can also help. Another way to prevent isolationism can also include compliance with demands set forth by North Korea or joint-cooperation in achieving mutual interests. However favorable or unfavorable some of these suggestions may seem, the advantage of targeting second-order causes is that the first-order causes shown in the tree are not the only things that can be affected. That can also be seen as a disadvantage if the unintended effects are unfavorable. In Figure 5.2, the only effects that can occur from altering feelings of isolationism are the survival mechanisms but that does not refute the point I just made above.

Defense funding is the second-order causes for military and nuclear capability. Another way to limit these capabilities would be to limit the amount of influence the Pyongyang government can exert financially. It is important to note that military and nuclear capabilities are two separate nodes. Affecting the defense funds of North Korea may affect one and not the other. Pyongyang could put all their eggs in one basket and maintain one program while shelving the other, which is why in drawing these cause and uses trees, great importance should be placed on keeping the first-order causes separate despite them coming from similar second-order causes.

Uses trees can be used to prepare counter-measures and understand why and how the variable reacts or unfolds. The uses tree shown in Figure 5.4 below demonstrates the first and second-order uses or effects that occur after North Korea displays one of their provocative shows of force.



Figure 5.4 Uses tree

The immediate first-order effect is that the action provokes fear in all regional countries and especially the US, South Korea, and Japan. What this reveals is that the provocations create an emotional and psychological first and foremost. This does not underscore the seriousness of innocent men and women dying like the Cheonan and Yeonpyong Island incidents, but I am speaking from the perspective of the state as an entity where a single decision can affect thousands and millions and lives. The fear instilled in the US-ROK-Japan alliance then translates into an immediate diplomatic engagement with Pyongyang and also creates instability in the region. North Korea, as a state who unabashedly flaunts power and might, creates fear and uncertainty in its neighbours. These effects need to be looked into so that proper countermeasures can be taken or so that the normal cycle of cause and effect can finally be broken. For years, the U.S. has employed the same tactics and diplomatic measures in response to aggression displayed by North Korea and the results have been disappointing and absent. Understanding how the system operates will be the key to formulating new, more effective policy.

6. Summary

6.1 Conclusion

The Sino-DPRK informal market system is a tenacious creature that has survived and thrived since its popularization in the 90's. With the current regime's focus on military spending and its nuclear program, its social programs like the PDS has been ignored and as a result, are wilting away in importance. Most North Koreans now engage in illegal market activity as a means of survival and now as a way to earn a living.

With around 40% of North Korea's economy tied to China, China has the ability to influence North Korea in a way no other country can. How China views Pyongyang's "smuggling" issue will be an important factor in determining the maturation of the informal markets.

The emergence and continual existence of the markets warrants an investigation into its possible social, political, or economical effects. This paper intended to not only try to illustrate the complex relationships but also the capabilities of the current regime in how it responds to this issue; furthermore, to also provide a framework for future systems based assessments on sociopolitical relationships.

The systems-thinking and systems-diagramming tools introduced include the functional hierarchy, decision tree, Systemigram, causal loop diagram, and swim lane charts. The purpose of these tools is the need to understand the relationships that the system in question is composed of.

6.2 Future Research for Systemigram and Causal Loop Models

We have started the process of developing the interdependencies, possible outcomes, and looked in depth at one particular aspect of social/economics that can affect the outcomes and end state of DPRK. The next step is to capture all of the various events and drivers (see Figure 1.1) and develop a model to try and predict the eventual end state. This model, probably based upon a systems dynamics representation, could be valuable as possibly a predictive tool but certainly as a means to structure the problem and outcomes in a way that subject matter experts could evaluate the first and second order effects of policy decisions.

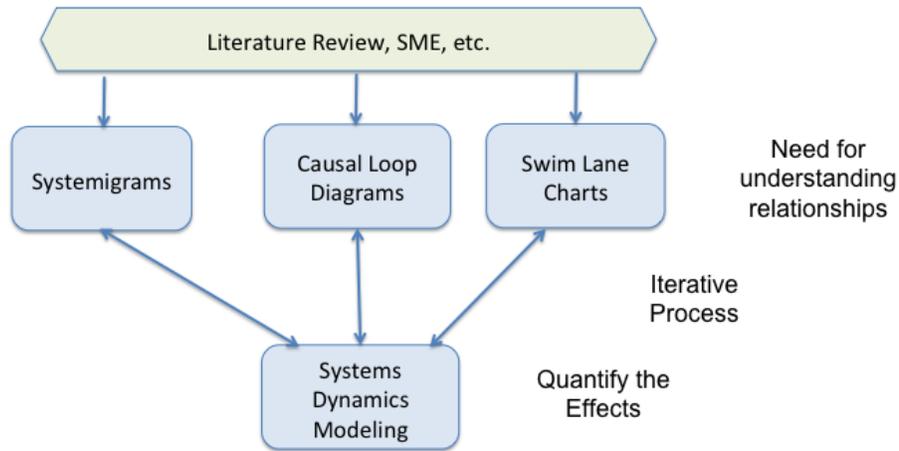


Figure 6.1 Further research efforts

The Systemigram and Causal Loop Models are used due to the need to first understand the relationships within and around the informal market system and how it relates to larger strategic objectives such as economic reform, human rights, and nuclear or military provocations carried out by North Korea. Next, the effects of the interactions need to be quantified so that an objective quantitative model of North Korea can be developed. This can be done through systems dynamics modeling, which is another tool in the systems engineering arsenal.

We have used systems dynamics modeling for modeling the capacity of a country to meet the needs of its people. The five-layer model developed by Han et al (2012) has shown promise in modeling the complex enterprise that constitutes at government. Figure 6.2 shows what this five-layer model might look like along with one of the layers. Note that systems dynamics modeling is more than causal relationships data and mathematical relationships describing the interdependencies are needed for the technique. However, system dynamics modeling hold great promise to quantify the effects of sanctions, investments, second order effects, etc., of actions by the international community as related to North Korea.

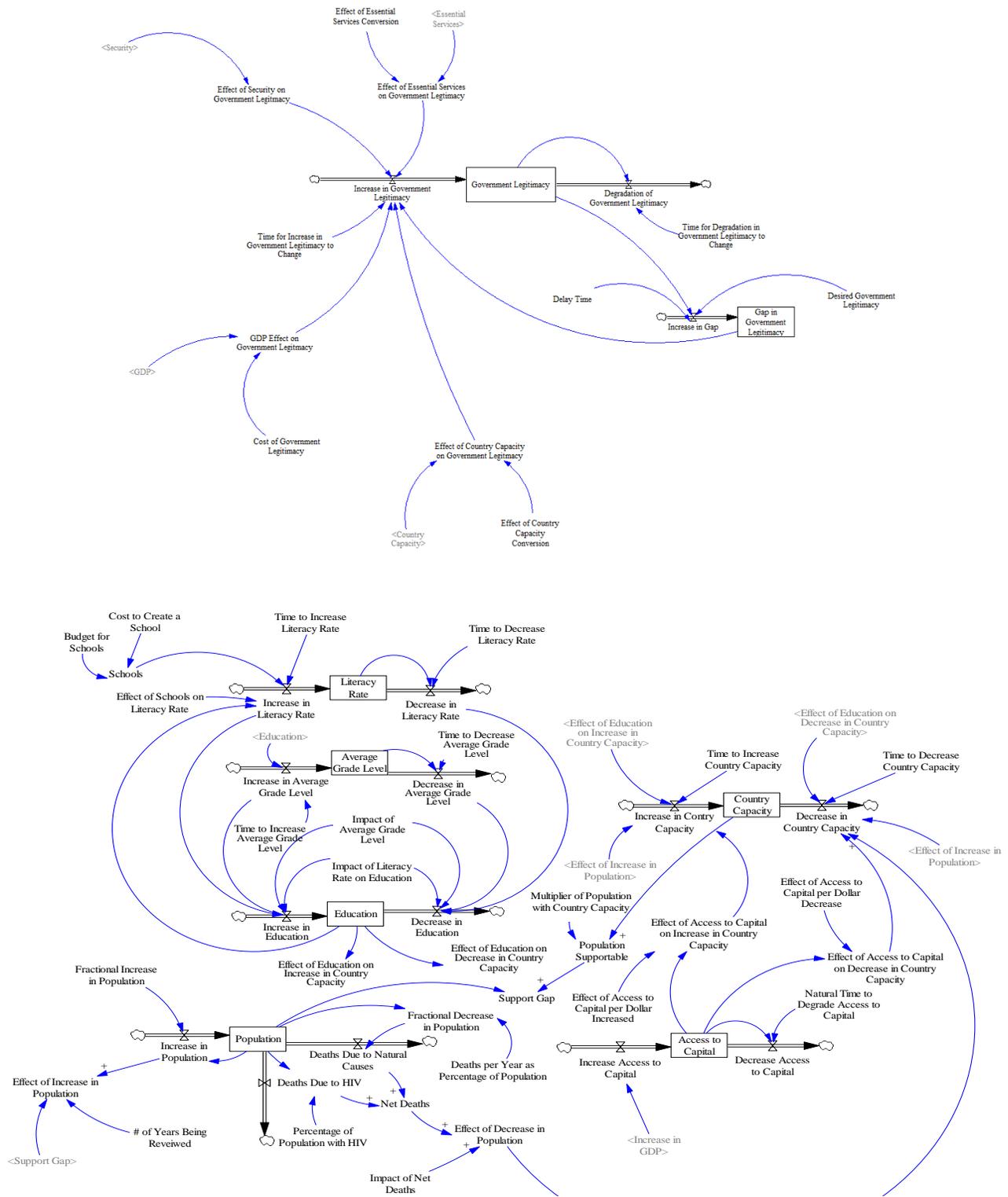


Figure 6.2 System dynamics five-layer model and details of the country capacity layer for Kenya (from Han et al, 2012)

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