

A COMPLEX-SYSTEMS APPROACH TO REMOVE THE NORTH-KOREAN NUCLEAR WEAPONS

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ABSTRACT

Last October (Oct 9, 2006) is a terrible day to South Korean people. North Korean Kim Jong-Il tested the nuclear weapons at Oct 9. And South Korean felt the fear and anger to North Korean Kim Jong-Il regime. It's because that South Korean didn't want to exist the nuclear weapons in Korean Peninsular. Also, U.S. Japan and China didn't want to accept to have nuclear weapons of North Korea. Korean Rho Moo-Hyun government tried to 'Sunshine Policy' to North Korea. It's pouring of materials assistance to North Korea because of humanity. And, South Korean government tried to make package tours to Mt. Kungang and the Kaesong Industrial Complex. It means that South Korean government tried to help North Korean economic difficulty. Nonetheless, North Korean Kim Jong-Il regime tested the nuclear weapons last October 9. In a word, North Korean act was the betrayal to South Korean people.

U.S. Vice President Dick Cheney had put pressure on China to become more active in resolving the North Korean nuclear crisis, warning it the North has nuclear weapons, Japan may start developing its own, Newsweek reported. Japan, meanwhile, is taking advantage of the North Korea's nuclear test to rearm. Actually, Japan worry about the North Korean nuclear weapons. It means that North-East Asian weapon balances broken. Also, it will begin to race having nuclear weapon through North Asian countries.

To remove the North Korean nuclear weapon is an inevitable proposition. I'd like to research 'A Complex-systems Approach to remove the nuclear weapons' from North Korea. Of course, to remove the nuclear weapons from North Korea is not a simple problem. We'll need to consider various factors to remove the North Korean nuclear weapons. It will be a Complex-systems Approach.

Keywords: complex-systems, nuclear weapon, sunshine policy, nuclear armament, weapon balance, to remove.

1. INTRODUCTION

Actually, the unification of two Korea is most big issue for Korean. It's because divided family suffered from lonely and critical life for a long time. Nobody knows who divided family's sorrows. Nonetheless, there is no sign to unify of two Korea. We, Korean had a big sorrow for sixty two years after 1945. There are so many barriers between two Korea. I think one of the most of all is the existence of the Nuclear Weapons in the Korean Peninsular.

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Korean didn't want to exist Nuclear Weapons in Korean Peninsular. Also, U.S, Japan and China didn't want to accept to have nuclear weapons of North Korea.

South Korean Rho Moo-Hyun government tried to 'Sunshine Policy' to North Korea. Its' main stream is to pouring of material assistance to North Korea because of humanity. Also, South Korean government tried to make package tours to Mt. Kumgang and the Kaesong Industrial Complex. It means that South Korean government tried to help North Korean economic difficulties. Nonetheless, North Korean Kim Jong-Il regime tested the Nuclear Weapons last October 9. In a word, North Korean act was one of betrayal to South Korean people.

I think one of the most critical problems for South Korean is the North Korean Nuclear problems. About fifteen years before, two Korean regimes promised that Korean Peninsular should not have the Nuclear Weapons. From time to time, North Korean regime announced they didn't want Nuclear Weapons in Korean Peninsular. But, they conducted an underground nuclear explosive test on October 9, 2006. The estimated yield of the test was less than one kiloton. It's a terrible astonishment for South Korean people. They believed North Korean government will stop making the Nuclear Weapons. Also, they thought the Nuclear Weapon didn't work positive influence to unify the divided two Korea. Anyway, the Nuclear Weapons problem is the hot issue for the world. How can we remove the Nuclear Weapons from Korean Peninsular? How can we explain the balance of North-East Asian countries? I think the removal of North Korean Nuclear Weapon is the most important assignment for the peace of Korean Peninsular. Therefore, I'd like to research to remove the North Korean Nuclear Weapon by Complex-systems Approach.

2. COMPLEX-SYSTEMS APPROACH

2-1. Complex-systems Approach methodology

There are two general methods for studying complex systems. The first method is a specific system is selected and each of the parts as well as their interactions are identified and described. The second method considers a class of systems, where the essential characteristics of the class described, and statistical analysis is used to obtain properties and behaviors of the systems (*Yaneer Bar-Yam*. 1997). In this paper, I selected the first method to make a complex systems approach to remove the North Korean Nuclear Weapons.

I owe its intellectual insight to David Easton's 'political systems theory', Yong-Pil Rhee's 'Dynamics and Complexity of Political system' and Prigogine's theory ("*successive bifurcations in an evolving system*" F. Cramer, 1993. foreword by Prigogine), Yaneer Bar-Yam's explanation about the complex systems. The study of complex systems in a unified framework has become recognized in recent years as a new scientific discipline, the ultimate of interdisciplinary fields. (*Yaneer Bar-Yam*, 1997)

I think we need considering the complex systems property for explaining the change of system. The properties of complex systems are change, growth, and death, possibly from life cycle. For complexity to emerge, two ingredients are necessary. The first essential ingredient is an irreversible medium in which things can happen: this medium is time, flowing from the past that lies closed behind us toward a future that is open. The second essential ingredient is nonlinearity. We are all familiar with linear systems that have been the mainstay of science for a long time. But, the nonlinear

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systems do not obey the simple rules of addition. Nonlinearity causes small changes on one level of organization to produce large effects at the same or different levels. In general, nonlinearity produces complex and frequently unexpected results. Irreversibility and nonlinearity characterize phenomena in every field of science (Peter Coveny & Roger Highfield, 1995). The two properties are the main ingredients of complex systems. Yong-Pil Rhee said that the systems analysis has frequently been associated with the study of political stability, it is assumed that systems analysis has anything to contribute to an understanding of political change. Eastonian systems theory does take as its central question the maintenance of the system, but he defines the system so broadly that there is room for a variety of structural changes within the systems that survive. Thinking in terms of independencies of elements within a system, in terms of demands and supports, and in terms of feedback relationship may lead to some interesting hypotheses about the possible source of political change. (Yong-Pil Rhee, '*Dynamics and Complexity of Political System*', 1999).

2-2. Complex-systems Approach to explain the North Korean problems

Easton saw that stability is only a special example of change, not a generically different one. He thought that there is never a social situation in which the patterns of interaction are absolutely unchanging. If stability is to have any sensible meaning, it must represent the condition in which the rate of change is slow enough to create no special problems due to change. In Easton's assumption, a political system that is self-regulation can respond and can adapt itself to environmental changes. The system contains feedback mechanisms, that is, mechanisms capable of transmitting information of a positive or negative character to the system. They provide information about the reaction to decisions which have emerged within the system, and thus instrumental in enabling the system to cope with these reactions in such a way as to ensure the persistence of the system.

Meanwhile, thermodynamics is that part of physical science that is concerned with the conditions that material systems may assume and the changes in conditions that may occur either spontaneously or as a result of interactive between systems, including interactions such as heat, which cannot be described in terms of mechanics. More recently thermodynamics has been extended to include physical system in non-equilibrium states. This theory of thermodynamics, as Prigogine and Jantsch explicitly or implicitly suggested, can be properly applied to the study of social phenomena.

From the theoretical assumptions of modern thermodynamics we can analyze the complex patterns of interactions among the North and South Korea and 4 countries (USA, China, Russia and Japan) over time. In non-equilibrium thermodynamics there are the reciprocity relations. Reciprocity relations have been the most important dynamics in the thermodynamics of irreversible process (Yong-pil, Rhee.1999). David Easton's political system theory is full of suggestions for political analysis. And, it suggests that we could analyze North Korean political system's reaction about the North Korean Nuclear Weapons. I think to explain the removal of North Korean Nuclear Weapons is possible by complex systems approach. Now, I'd like to research a Complex-systems Approach to Remove the North-Korean Nuclear Weapons as below.

3. THE PROBLEMS OF THE NUCLEAR WEAPONS ON THE KOREAN PENINSULAR

3-1. Joint Declaration on the Denuclearization with South and North Korea

In July 1988, South Korean President Roh Tae-Woo called for new efforts to promote North-South exchanges, family reunification, inter-Korean trade, and contact in international forums. In September 1990, prime minister-level meetings between North Korean and South Korean officials took place in Seoul. The talks resulted in two major agreements: the Agreement on Reconciliation, Nonaggression, Exchanges, and Cooperation (the "basic agreement") and the Declaration on the Denuclearization of the Korean Peninsula (the "Joint Declaration"). The Joint Declaration called for a bilateral nuclear inspection regime to verify the denuclearization of the peninsula. The Declaration, which came into force on 19, February, 1992, states that the two sides "shall not test, manufacture, produce, receive, possess, store, deploy use nuclear weapons," and that they "shall not possess nuclear reprocessing and uranium enrichment facilities." On 30 January 1992, the DPRK also signed a nuclear safeguards agreement with the IAEA, as it had pledged to do in 1985 when acceding to the Nuclear Non-Proliferation Treaty. This safeguards agreement allowed IAEA inspections to begin in June 1992. This promising development was halted by the North's refusal in January 1993 to allow special inspections of two unreported facilities suspected of holding nuclear waste. Ignoring the South-North Joint Declaration of the Denuclearization of the Korean Peninsula, North Korea refused IAEA inspections and operated nuclear reprocessing facilities, making the world suspicious of its nuclear intentions. Lack of progress on implementation of the denuclearization accord triggered actions on both sides that led to North Korea's March 12, 1993, announcement of its withdrawal from the Nuclear Non-Proliferation Treaty (NPT). The North's threat to withdraw from the Nuclear Non-Proliferation Treaty (NPT) brought North-South progress to an abrupt halt. Tensions ran high on the Korean Peninsula as the confrontation between North Korea and the United States.

3- 2. Geneva Agreement on October 21, 1994

Official negotiations between the two sides opened on July 8, 1994 in Geneva, and led to the signing of the Agreed Framework on October 21. The Agreed Framework signed by the United States and North Korea. North Korea would freeze its existing nuclear program and agree to enhance International Atomic Energy Agency (IAEA) safeguards.

Both sides would cooperate to replace the North Korea's graphite-moderated reactors for related facilities with light-water (LWR) power plants.

Under terms of the agreement, North Korea was obligated to freeze its graphite-moderated reactor at Yongbyon and halt construction of two more reactors. In return, the United States agreed to undertake to make arrangements for the provision to North Korea of a light water reactor (LWR) project with a total generating capacity of approximately 2,000 MW(e) by a target date of 2003. An international consortium would be organized under the leadership of the U.S. to finance and supply the project. As a result, South Korean regime will burden 75% of the financial support. Light

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water reactors do not hold the same potential as graphite-moderated reactors for the production of plutonium that can be reprocessed for use in the development of nuclear weapons. As an interim measure, while the light water reactors were under construction the United States was obligated to supply North Korea annually with 500,000 tons of heavy fuel oil for heating and electricity production.

Also, KEDO(Korean Peninsular Energy Development Organization) was going to make a LWR at the North Korean Shinpo area by South Korean Electronic Company. LWR model was unique Korean model devised by Korean Electronic Company. Actually, constructing LWR was big event for South Korean regime. South Korean regime would be a big sponsor of the LWR.

By the way, North Korean Authorities tried to make the nuclear weapon. They broke the contract that they should not reprocess the used fuel to produce the plutonium. I think North Korean Authorities have been had the fear of U.S. Also, they thought the nuclear weapon is the last shield for their lives. But, their selection was not so good. They swindle related countries out of their attentions. Especially, South Korean was frustrated by North Korean regime's acts. The tension of Korean Peninsular is so high that world countries attention the North Korean regime.

3-3. North Korean Nuclear Explosion Test

North Korea has once again raised the stakes in its showdown with the rest of the world by announcing it successfully conducted a test of a nuclear weapon on October 9. It is not a surprise that the North Korea has a nuclear weapon—United States intelligence estimates have shown for some time now that the North Korea possesses at least one or two nuclear weapons and enough nuclear material for many more weapons. Nonetheless, if a nuclear test did occur, that test is both provocative and intolerable. In response to the test, the U.S. and its allies must extend a comprehensive offensive and defensive deterrent policy to the Korean Peninsula. (Michael A. Needham, web Memo # 1232. 2006)

Kim Jong-Il's interests in pursuing a nuclear test include intimidating American allies in Japan and South Korea, further impairing the U.S. alliance with South Korea, and putting pressure on the United States. His behavior flies in the face of clear messages from the United Nations as well as key stakeholders in international stability. For the last year, North Korea has refused to rejoin the Six Party Talks, negotiations between North Korea, the United States, China, South Korea, Japan, and Russia aimed at solving the North Korean nuclear issue. Coupled with its refusal to participate in the Six Party Talks, North Korea has never had any interest in good faith negotiations. Rather, North Korea's consistent approach has been to keep the responsible world tied up at the bargaining table while the regime builds its nuclear weapons program.

President Bush said "The United States of America will not permit the world's most dangerous regimes to threaten us with the world's most destructive weapons."

President Bush's analysis underscores the reasons it is intolerable for North Korea to have the weapons Kim Jong-Il has now shown the world he possesses. The gravest threat, however, is that Kim Jong-Il will overestimate the leverage he has gained and behave recklessly as a result. In fact, he has gained very little new leverage on the rest of the world. Rather, he has further isolated himself by aggressively ignoring an international consensus that a North Korean nuclear test is intolerable.

Perhaps, Kim Jong-Il may believe that a successful nuclear test provides him with a safety blanket from under which he may lash out at the region and cause greater instability. Actually, the possibility of a devastating North Korean attack on South

Korea and Japan with the conventional rockets and missiles or from the use of weapons of mass destruction like nuclear weapons is terrible scenario for us.

4. COMPLEX SYSTEMS APPROACH TO REMOVE NORTH KOREAN NUCLEAR WEAPONS

In Easton's assumption, a political system that is self-regulation can respond and can adapt itself to environmental changes. Therefore, we can make various input factors to change North Korean regime as below.

4-1. Approach from the sanctions by United Nations Council

The UN Security Council imposes sanctions to enforce international law. Sanctions are supposed to persuade rulers to change their military, economic, or human rights policies, so as to end wars, civil conflicts or other crises that threaten international peace and security. After the 9/11 attacks in the US, Washington put North Korea on the axis of evil list and has since contended that North Korea's possession of nuclear weapons poses a serious threat to the world. Several times, the US administration proposed bringing North Korea before the UN Security Council to impose economic sanctions. However China, North Korea's main ally and trading partner, indicated that it would likely veto any sanctions on Pyongyang.

Following North Korea's nuclear test in October 2006, Security Council members imposed sanctions on Pyongyang. The targeted sanctions include an embargo on military and technological materials and luxury goods, as well as a set of financial sanctions. A month after the Council adopted the US-backed sanctions, North Korea agreed to return to the Six-Party Talks, including China, Japan, South Korea, Russia, the US and North Korea. The talks, which begun when North Korea withdrew from the Nuclear Non-Proliferation Treaty in 2003, are a negotiation forum on Pyongyang's nuclear program. At last, North Korea regime consented to the Six-Party Talks. And make a decision '2-13 Resolution'. Of course, it's not the last ending the North Korean Nuclear Weapon's problems. But, I think the Sanction is one of the cues resolving the North Korean Nuclear Weapons Problems.

4-2. Approach from the international pressure by the 6-party talks

18 December, 2006 a new round of the talks aimed at persuading North Korea to abandon its nuclear weapons program has begun in Beijing after a 13-month hiatus. Roger Wilkison reports from Beijing that China, Russia, Japan, South Korea and the United States are trying to determine whether North Korea really is prepared to negotiate following its nuclear test in October.

The purpose of these talks is to get North Korea to implement a written pledge it made in September 2005 to abandon nuclear weapons in exchange for aid and security guarantees. But that was before the North tested a nuclear device last October, and Pyongyang now says it wants to be considered a nuclear power.

U.S. Assistant Secretary of State Christopher Hill says the international community will not accept North Korea as a nuclear state. "If they want a future with us, if they want to work with us, if they want to be a member of the international community, they are going to have to get out of this nuclear business."

On Feb. 13, North Korea agreed to shut down and disable its nuclear programs and

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weapons in return for incentives provided by other members of the six-party talks - the United States, Russia, China, Japan and South Korea.

The United States and North Korea have resolved a dispute over \$25million in frozen North Korean funds, clearing the way for progress in dismantling the North's nuclear programs. Of course, there are so many noises to draw the fund from BANCO DELTA bank, but it will be resulted good relation with both. I think this event will work as a negotiator.

4-3. Approach from the recovery of the relation with South and North Korea

4-3-1. Meets with South and North

In these days, South and North Korean regime have a frequent meeting for South and North talks. A senior North Korean diplomat, Kim Kye-Gwan visited the United States and he expressed a strong desire for his country to have better relations with South Korea and the United States. Also, he said he does not want a war on the Korean Peninsula. He is the North's vice foreign minister and top delegate to the six-party nuclear negotiations and he had a working group session on diplomatic normalization with the United States.

He also met over the weekend with his South Korean counterpart Chun Young-woo and with Charles Kartman, former head of the now-defunct Korean Peninsula Energy Development Organization. (17 May, 2007 Korea Herald)

Under the Feb. 13 agreement, the North must shut down and seal its Yongbyon nuclear complex and admit international inspectors by mid-April.

North Korean officials said they want to be good relation with US, and South Korea. Also, South Korean government intends to be a good relation with North Korea because of the peace of Korean Peninsular.

4-3-2. Historic test-runs of cross-border railways

The two Koreas agreed to hold a high-level military talk to discuss safely guarantees for historic test-runs of cross-border railways slated for May 17. The two sides agreed during economic talks last month to conduct the rail tests on May 17, but that accord lacked consent from the North's military. Last year, the North called off planned rail tests at the last minute. Last May (May 6-12, 2007), Seoul originally proposed working-level officers meet at the truce village of Panmunjeom in the Demilitarized Zone. The North suggested upgrading the rank of the negotiators to generals and holding three days talks. And, the negotiation is ended successfully. Also, test was successfully ended.

4-3-3. South Korean regime restarted the support with rice and fertilizer

South Korean regime restarted to send the rice and fertilizer. Its' amount is so big that the South Korean paupers astonished about it. The size of the support is about \$1.2 billion on 2007. It means that North Korea can't deny good relation with South Korea. Also, North Korean Authorities will thank about the South Korean people. I think it'll be an invisible pressure to remove the North Korean Nuclear Weapons from Korean Peninsular.

4-3-4. Economic aid for the impoverished North Korea

Meanwhile, officials from the two Koreas continued talks at the North Korean border town of Gaeseong to discuss South Korea's economic aid for the impoverished North. The three-day talks are aimed at determining the size and timing of Seoul's \$80-

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million assistance for North Korea's light industries, such as shoe and garment businesses. Also, Seoul's assistance is mostly in raw materials, and is to be paid back with North Korean natural resources. The working-level talks follow the 13th inter-Korean economic cooperation meeting April, 2007 in Pyongyang. . I think it's a good relation with two Koreas.

4-4. Demands from the North Korea's internal needs for upgraded lives

Also, North Korea's internal demands will work to remove the North Korean Nuclear weapons. I think the North Korean Authorities will know about the Nuclear weapon will be a barrier to reach South and North Korean relationships. For a long time, North Korean people had been lived without sufficient materials. They were accustomed to endure the difficulty from hunger and difficult. I think all of North Korean want to be a plenty lives without hunger and difficult. They are exhausted with through the life.

Also, divided people will want to be a free travel with no threat at all. It means that North Korean regime have to abandon the Nuclear Weapons.

But, there were bad news about the disappeared officials because of to try to start the incentive system.

Hwang Jang-yeup, 10 years before escaped from North Korea, said North Korea would be disappeared without South Korean regime's support like 'Sun-shine policy'. Anyway, I think internal demand of North Korea people will be one of the factors to remove the North Korean Nuclear Weapons.

4-5. Time and Nonlinearity as special pertinent

I think 'to remove the North Korean nuclear weapons' is more complex-systems problems. So many systems and factors inter-related each other. Also, all of the factors are affected each other. Actually, several systems are related each other. Also, time and nonlinearity is the property of the complex systems. We can imagine the North Korean Nuclear Weapons situation is one of the complex systems.

Also, 'Time and Nonlinearity' will be affected as special pertinent. 'Time' is will be a big pertinent for the North Korean Nuclear Weapons system. In the future, the North Korean real leader will be changed as like human history. Also, the North Korean Nuclear Weapons system will be changed more rational situation. Also, Nonlinearity means that the future is unpredictable and flexible society.

As a result, the North Korean Nuclear Weapons system will change. At last, North Korean regime will select to remove the Nuclear Weapon as Libya.

5. CONCLUSION

I think to Remove the North Korean Nuclear Weapon is one of the most difficult problems. But, it was inevitable problem for us Korean. All of the East Asian countries and U.S. concerned with North Korean Nuclear Weapons.

I think 'to remove the North Korean nuclear weapons' is more complex-systems problems. So many systems and factors inter-related each other. Also, all of the factors are affected each other. Actually, several systems are related each other. At chapter 4, I introduced several systems to explain for the removal of the North Korean Nuclear program. In a word, 'to remove the North Korean Nuclear Weapons' is not a single problem. As we noticed, we need to think about two pertinent. One is time, and

the other is nonlinearity.

We can imagine the North Korean Nuclear Weapons situation is one of the complex systems. Also, we can imagine it have several factors like as **the sanctions by United Nations Council, the international pressure by the 6-party talks, the relation with South and North Korea, the North Korea's internal needs for upgraded lives. That'll be affected each other.**

We can conclude as bellows.

- (1) The sanctions by United Nations Council made North Korea agreed to return to the Six-Party Talks, including China, Japan, South Korea, Russia, the US and North Korea. The talks, which begun when North Korea withdrew from the Nuclear Non-Proliferation Treaty in 2003, are a negotiation forum on Pyongyang's nuclear program. At last, North Korea regime consented to the Six-Party Talks. And make a decision '2-13 Resolution'.
- (2) The United States and North Korea have resolved a dispute over \$25million in frozen North Korean funds, clearing the way for progress in dismantling the North's nuclear programs. It'll be a good choice to resolve the North Korean Nuclear problems.
- (3) The recovery of the relation with South and North Korea made the Historic test-runs of cross-border railways. Also, South Korean regime restarted the support with rice and fertilizer. As a result, economic aid for the impoverished North Korea. Also, it'll be a cue to resolve the North Korean Nuclear problems.
- (4) Also, demands from the North Korea's needs for up graded lives will work to remove the North Korean Nuclear weapons. I think the North Korean Authorities will know about the Nuclear weapon will be a barrier to reach South and North Korean relationships.
- (5) Also, Time and Nonlinearity will be affected as special pertinent. 'Time' is will be a big pertinent for the North Korean Nuclear Weapons system. In the future, the North Korean real leader will be changed as like human history. Also, the North Korean Nuclear Weapons system will be changed more rational situation. Also, Nonlinearity means that the future is unpredictable and flexible society.

As a result, the North Korean Nuclear Weapons system will change. I hope North Korean regime will select to remove the Nuclear Weapon as Libya.

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