

# Systems Thinking in the Management of Korean Economic Crisis

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*After the unanticipated financial crisis of Korea in 1997, lots of debates have been held on why and how it came upon. Most of debates including hearings of National Assembly focused their attention on why policy makers could not forecast and avoid the financial crisis. No one, if any, asks whether or not there were systems thinking in the mind of economic policy makers, what was their theory in action that failed in managing the national financial crisis. This paper explores causal maps and systems thinking of the President of Korea who successfully managed the financial crisis. In this paper the causal map analysis of policy makers is proposed as a promising approach for in-depth investigation of systems thinking of policy makers.*

## **1. Are Policy Makers Lack Feedback Thinking?**

Working with policy makers in several years, I learned a maxim saying “policy makers are not idiots nor genius (NING).” Also I found that policy analysts tend to assume them as either idiots or genius. Economists usually suppose a policy maker who knows more than any economists ever lived. On the other hand, behavioralists usually regard a policy maker as intellectually handicapped person. At both extreme poles, one can find simple and nice theories and explanations, which cannot be applied well to real persons in real situations.

Lots of studies and experiments found that most decision makers cannot account well for feedback processes and thus perform poorly in complex systems of many feedback loops (Sterman 1989, Brehmer 1990). As Paich and Sterman point out, poor performance in the feedback systems can result from two distinct levels; misperception of feedback structure and miscalculation of feedback dynamics (Paich & Sterman 1993). The misperception of feedback is regarded as a common feature of decision makers.

Although studies on the misperception of feedback produced great implications for analysing policies, there are many questions untouched and unanswered. How many feedback loops policy makers misperceive? Are they totally ignorant of the feedback loops? What kind of feedback loops they tend to ignore? What kind of feedback loops tend to be over-emphasized by policy makers? Do correct perception of feedback loops guarantee successful performance?

These questions go far beyond the realm of designed experiments. Especially experimental designs that focuses on measuring performance level of subjects are hard to answer these questions. To answer or touch these questions we need qualitative research methods. In this paper a causal map analysis of real policy makers

is used to find some clues to these questions.

## **2. Feedback Loops in Previous Studies of Cognitive Maps**

The misperception of feedback loop is firstly reported in early days of cognitive map studies by Axelrod and his colleagues (Axelrod 1976, Bonham, Shapiro, Tremble 1979). His group constructed three cognitive maps of real policy makers and found that there are no feedback loops.

“But the point is that neither positive nor negative feedback loops, and neither long nor short loops are present in any of the three spontaneous cognitive maps that have been investigated in detail. This is curious. The absence of cycles in these maps seems to indicate that the images of the policy environment which these decision makers present to each other in their meetings are devoid of feedback. It is curious precisely because we know that feedback is vital aspect of the dynamics of almost any complex environment, especially social environments (p.232, Axelrod 1976)”

Axelrod tries to explain the phenomena of no feedback loops by saying that “Thus the explanation seems to be in the way people conceptualize causation: they seem to see it as flowing outwards, and not turning back to affect some other concept variable that is regarded as causally prior”.

However, Axelrod’s generalization of none-feedback loop phenomena failed when subsequent studies on cognitive maps found many feedback loops present in the cognitive maps of policy makers. Especially Kissinger’s cognitive map is famous for abundance of feedback loops (Maoz 1990). Maoz found not only short cycles but also longer cycles in Kissinger’s cognitive map.

“This cycle may be interpreted as follows. The greater the fear from nuclear holocaust, the more constructive will US-Siviet relations be. The more constructive these relations, the greater the hope for peace. The greater the hopes for peace, the less conflicting the ideologies between the superpowers, and hence the less the fear from nuclear holocaust. Although such an involved argument was never explicitly made by Kissinger in the speech, this causal path is a logical derivative of the explicit assertion that Kissinger did make. (pp.132-133, Maoz 1990)”

Observing several feedback loops embedded in cognitive maps, researchers in cognitive maps have paid little attention on the phenomena of feedback misperception. However, this is far from saying that policy makers can account well for the feedback structures. Cognitive map analysts regard the feedback loops only as an indicating measure of complexity of mental maps (Bougon, Weick, Binkhorst 1977). Usually cognitive map analyses do not include the investigation of the feedback structures. Although cognitive map studies do not provide clear cut conclusions on the perception or misperception of feedback loops, their studies show that some policy makers are aware of feedback structures at least partially.

## **3. Causal Maps of Policy Makers**

Previous studies of cognitive maps seem to be insufficient to analyze the feedback perception of policy makers. First, cognitive map analyses usually focus on specific events and thus causal assertions of policy makers are collected from their speech concerning on those events in a rather short time period. Cognitive maps constructed from one or two speech cannot fully capture the feedback thought of policy makers because policy makers' speech are commonly intended to advocate certain policy measures rather than explain system structures. Second, cognitive maps include every causal assertions of policy makers. And hence causal maps become too complicated to be analyzed properly (Eden 1994).

To avoid these drawbacks of traditional approach of cognitive maps, I have focused on the 'causal maps of policy makers (CMPM)' rather than their 'cognitive map'. A causal map of policy makers is different from their cognitive map in that the former deals with policy makers' assertions in longer time period than the latter and the former includes only those variables that comprise feedback loops. By dealing with policy makers' causal assertions dispersed in the long period, we can avoid event-specific causal assertions and capture the overall feedback thought of policy makers. By focusing on the variables comprising feedback loops, we can simplify and clarify systems thinking of policy makers.

As causal map of policy makers is different from the cognitive map, it differs also from the traditional causal map. The causal map of policy makers represents their personal mental models, while the traditional causal map is intended to capture objective structures of systems. One can analyze how much systems thinking policy makers exercise by studying their causal maps.

At the end of 1997, Korea experienced a national financial crisis and the first change of political power. After taking over the government office, President Dae Jung Kim began to restructure Korean economic structure. Against the expected resistance to his reforming efforts, President Dae Jung Kim tried to persuade business men and the people by explaining causes of financial crisis and how to overcome it. In order to construct a causal map of President Dae Jung Kim, I have collected all kind of assertions spoken by him in 1998 year. His assertions collected and analyzed are around 1,000 page volume.

#### **4. Main Feedback Loops of President Dae Jung Kim**

The most prominent feature in the causal map of President Dae Jung Kim on Korean economy is that he has a lot of feedback loops. In following sections I would like to explain several important feedback loops and then present overall structure of his causal map.

##### **4-1. Political Mechanism Leading to Economic Crisis**

During past thirty years President Dae Jung Kim has insisted that democracy should be established. And he has been oppressed by military leaders who argued that democracy must be postponed in favor of economic growth. Even he has been near to death by assassination and has been sentenced to death by military court. Thus it is not surprising that he attributes the cause of economic crisis to the lack of democracy.

Lacking the democracy in political arena, there comes the collusive ties between

politics and business that result in government controlled financing that benefit specific firms who support military powers. In this process, the firms who can profit easily with the support of government controlled financing lost their competitiveness. And the firm who lost market competitiveness cannot but strengthen the collusive ties to the government to survive in the market. This positive feedback loop reinforces corruptions while weakens industrial competitiveness in the long run.

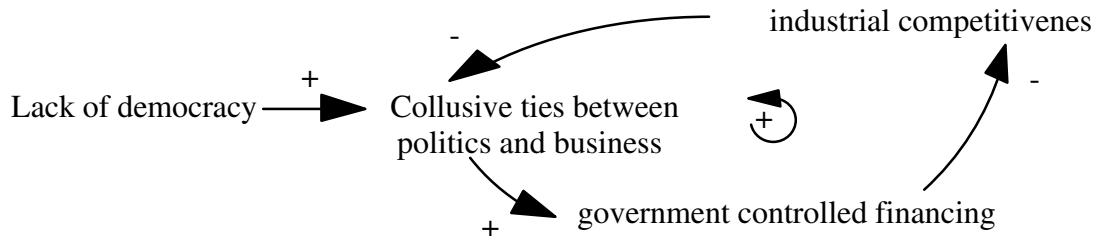


Figure 1. A positive feedback loop for weakening industrial competitiveness

#### 4-2. On The Effects of Financial Crisis

The financial crisis occurred in 1997 drives Korea near to the moratorium that means national bankruptcy. Foreign exchange rates, especially exchange rate between US dollar and Korean currency, began to increase abruptly and thus the interest rates for business loan. As a natural consequence, lots of firms has bankrupted and unemployment rate began to rise. In these unstable situations, it is very difficult for a policy maker to observe the effects of economic crisis. Figure 2 shows how President Dae Jung Kim diagnosed the crisis.

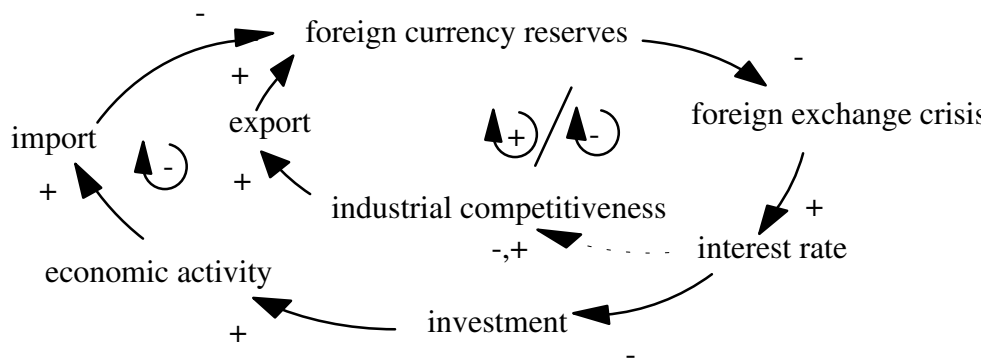


Figure 2. Feedback loops for the effects of financial crisis

There are two feedback loops in figure 2. In these loops, it is commonly recognized that the foreign exchange crisis is caused by the decrease in foreign currency reserves and the foreign exchange crisis will increase interest rate of loans. The outer feedback loop says that the degree of financial crisis will be decreased by itself through increasing the interest rate that will reduce the amount of importation and thus increase the foreign currency reserves.

A feedback loop located inside needs an explanation. A dotted arrow in this loop is a point, where IMF (International Monetary Fund) officials and Dae Jung Kim insisted opposite polarity. Dae Jung Kim thought that high interest rate is harmful to the industrial competitiveness, while IMF officials regarded the high interest rate as increasing the competitiveness by way of exterminating the less competitive firms.

The interest rate policy was the most hot issue debated in 1998. This difference between them leads to the different perception of the polarity of the small feedback loop. Dae Jung Kim regarded it as positive loop that will aggravate the financial crisis. From the perspective of Dae Jung Kim, the high interest rate is detrimental to the Korean economy. That is why Dae Jung Kim tried to decrease the interest rate against the will of IMF and against his own perception of negative feedback loop effect of financial crisis and the interest rate.

### 4-3. Strategic Reform for Overcoming the Crisis

At the end of 1997 when Dae Jung Kim was elected as new President of Korea, most people perceived risky economic states and felt dangerous. In this situation, President Dae Jung Kim declared that he can overcome the national economic crisis within two years. No one if any believed his promise but have no choice but to follow his leadership. And after one and six months of his leadership, they were surprised to find lots of symptoms signalling economic recovery.

Dae Jung Kim poured his entire time and efforts into reforming financial institutions and business structures. It is a rule that reform will bring about resistance from conservative parties. Figure 3 shows how did he overcome the resistance and thus the crisis with strategic use of feedback loops.

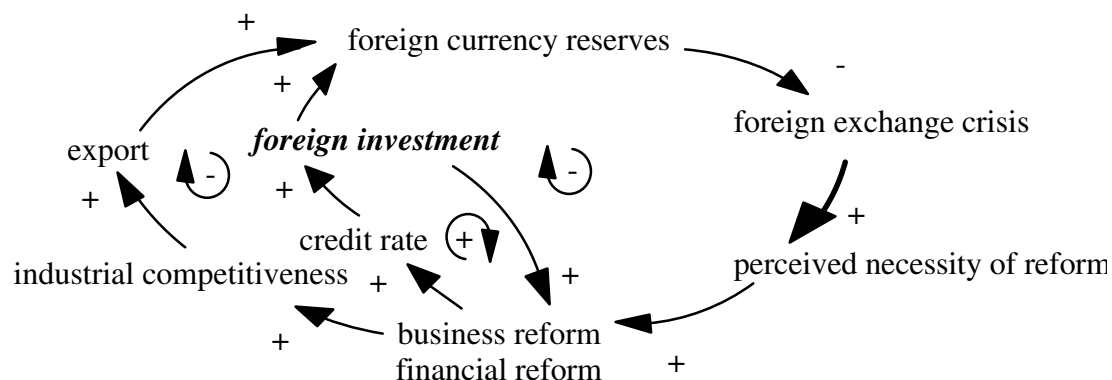


Figure 3. Strategic use of feedback loops

First of all, he noted that the financial crisis increases the perceived necessity of reform that will oppress the resistance. The thick arrow in figure 3 represents this notion on causal relationship between the crisis and reform. As soon as he assumed the presidency, he stressed that the financial crisis is just like a national war occurred fifty years ago. And he can strongly drive the reform policy in 1998.

In addition to the reform policy, he introduced a new variable that will alleviate the financial crisis; the foreign investment. Korean economy had been famous for low level of foreign investment. Dae Jung Kim argued that we can overcome the financial crisis only with rapid increase in foreign investment. With the introduction of foreign investment two additional feedback loops were created; positive and negative loops. The reform brought about by the financial crisis will increase the credit rate and thus the foreign investment. The foreign investments will increase the foreign currency reserves and thus lowers the financial crisis. This is a negative feedback loop that controls the financial crisis.

The introduction of foreign investment also creates a small positive feedback loop shown in figure 3. The foreign investment requires the higher level of transparent financial management that will necessarily change the traditional custom of business and financial institution of Korea. Within this positive feedback loop a business reform results in more revolutionary reforms required by foreign investment agencies. This positive feedback loop accelerates the reform of business and financial institution. With the introduction of strategic policy variable, the resistance against reform has been counter-resisted by the positive feedback loop.

#### 4-4. A Crisis in Overcoming Crisis

Although Dae Jung Kim was very clever in overcoming the financial crisis of Korea, there was also a crisis in his crisis management that came from the discontented people with the high rate of unemployment. Figure 4 shows how critical the discontent of people was to his reform policy.

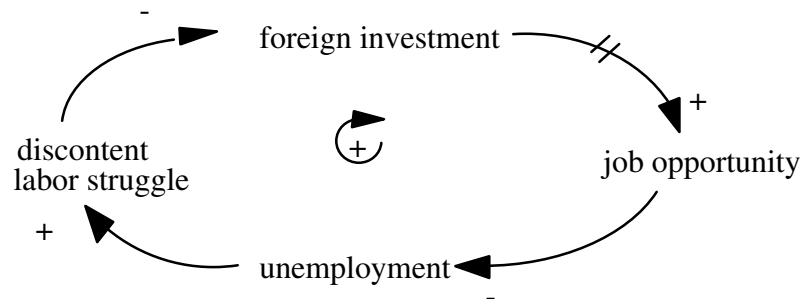


Figure 4. A crisis from the high rate of unemployment

The most weak point in his policy in exploiting the foreign investment is that it is highly sensitive to the discontent level of people and especially to the labor struggle. The Korean labor struggle is notorious for its strong activity that has been formed during the past military power regimes. Although labor forces were friendly to Dae Jung Kim in the past, they opposed to his reform policy as the unemployment rate goes high. The labor struggle was detrimental to his crisis management policy, because it will decrease the foreign investment.

Furthermore the labor struggle and decrease of foreign investment forms a positive feedback loop as shown in figure 4. How did he deal with this positive feedback threat? One of the most effective policy leverage in the positive feedback lies in the critical mass. Once the key variable in the positive feedback loop goes down below the critical mass, the effect of positive feedback loop will shrink. To control the positive feedback loop of figure 4, one must reduce the level of discontent and labor struggle while increase the level of foreign investment below and above respective critical mass.

However, what makes the matters worse is that the effect of foreign investment will take long time delay. To complement the time delay, one must reduce the level of discontent and labor struggle at least for the same time period of delay. To do this, Dae Jung Kim organized the tripartite commission among labor force, employers and government. As soon as he was elected as the President, he started its organizing. And even before his inauguration day, the tripartite commission reached an agreement on important measures toward business reform. With this agreement he could control the

strength of labor struggle under the critical mass.

## **5. Systems Thinking of the President Dae Jung Kim**

The causal map of Dae Jung Kim shows that he has lots of feedback loops. He seems to account well for those loops. Even he has used those loops strategically in enforcing his reform program. Korean economy showed many symptoms of recovery at 18 months after the financial crisis, much earlier than he has promised. On observing those symptoms he expressed pride but his reaction was very cautious. He stressed that Korean economy is far from recovery and thus must continue the reforming efforts. His careful reaction was exceptional in that most politicians are likely to over state his performance to increase popularity. His careful reaction seems to be highly strategic, which comes from recognizing the negative feedback loop discussed in figure 3. The abundance of feedback loops he accounted is impressive. Figure 5 shows the overall feedback structure of causal statements spoken by Dae Jung Kim in 1998.

One can compare his causal map with that of past Deputy Prime Minister Kyung-Sik Kang shown in figure 6. In the early of 1999, Congress held a series of hearings to investigate the causes of financial crisis. Past Prime Minister who have failed in preventing the financial crisis was presented in the hearings and expressed his thought. The cognitive map of past Prime Minister is built from those hearings and complemented from his several speeches addressed during his occupation in the Prime Minister in 1997.

One can find that the cognitive map of past Prime Minister has almost no feedback loop. He showed the misperception of feedback loops as the subject in experiments. Considering the fact that he has been more educated in economic theory than President Dae Jung Kim, the lack of feedback loops is curious phenomena enough. One can suppose some reasons for his misperception of feedback loops. First of all, one can conjecture that causal statements he expressed in the hearings was intended to defend himself and so he could not express every causal statements that might comprise feedback loops. However one cannot accept this explanation because there are lots of feedback loops that can be used for his defense. Some positive feedback loops that aggravates the financial crisis can be refered to for proving its uncontrollable nature and thus his exemption from the responsibility. But he did not mentioned any such feedback loops.

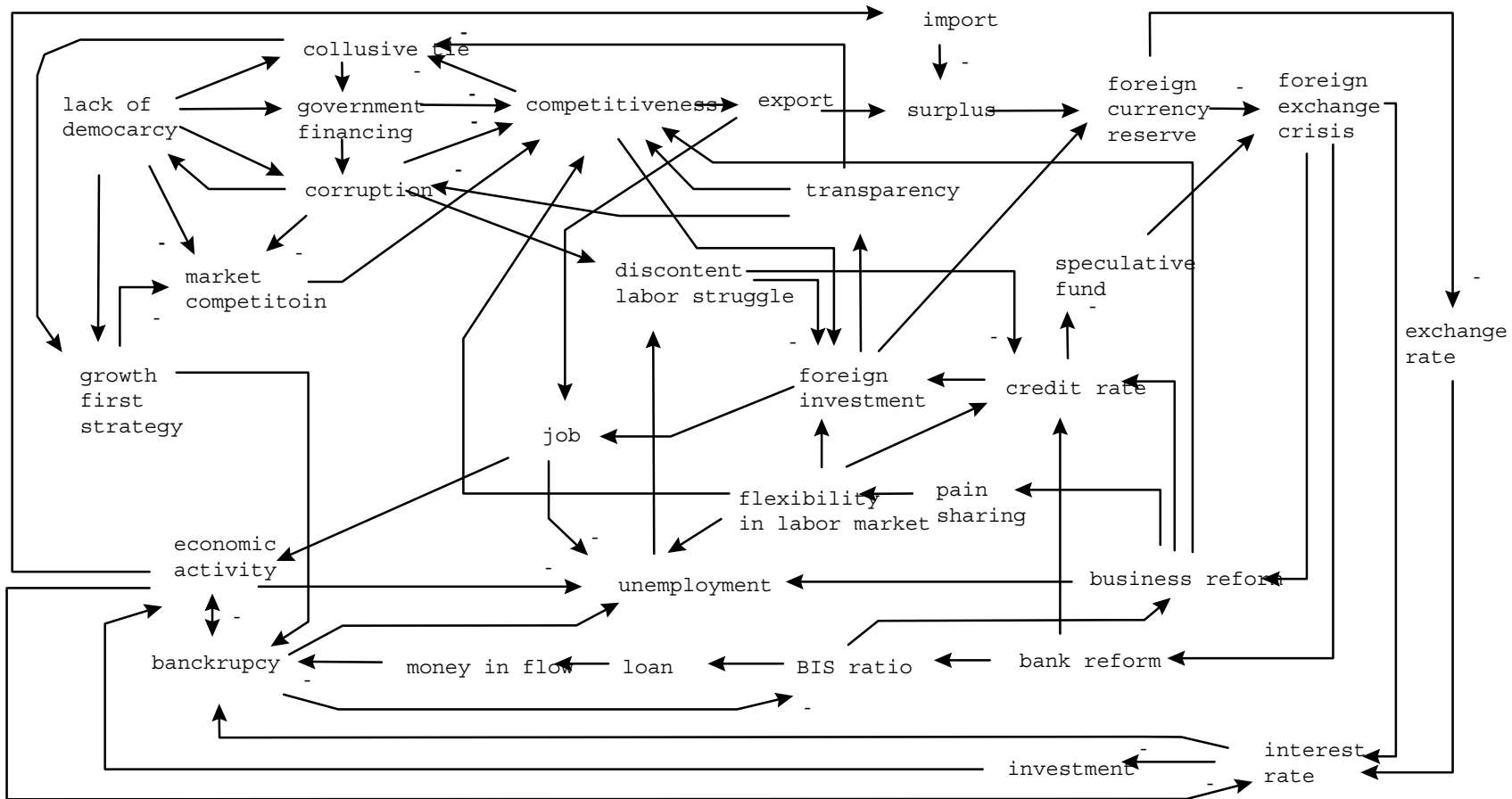


Figure 5. Causal Map of President Dae Jung Kim in 1998



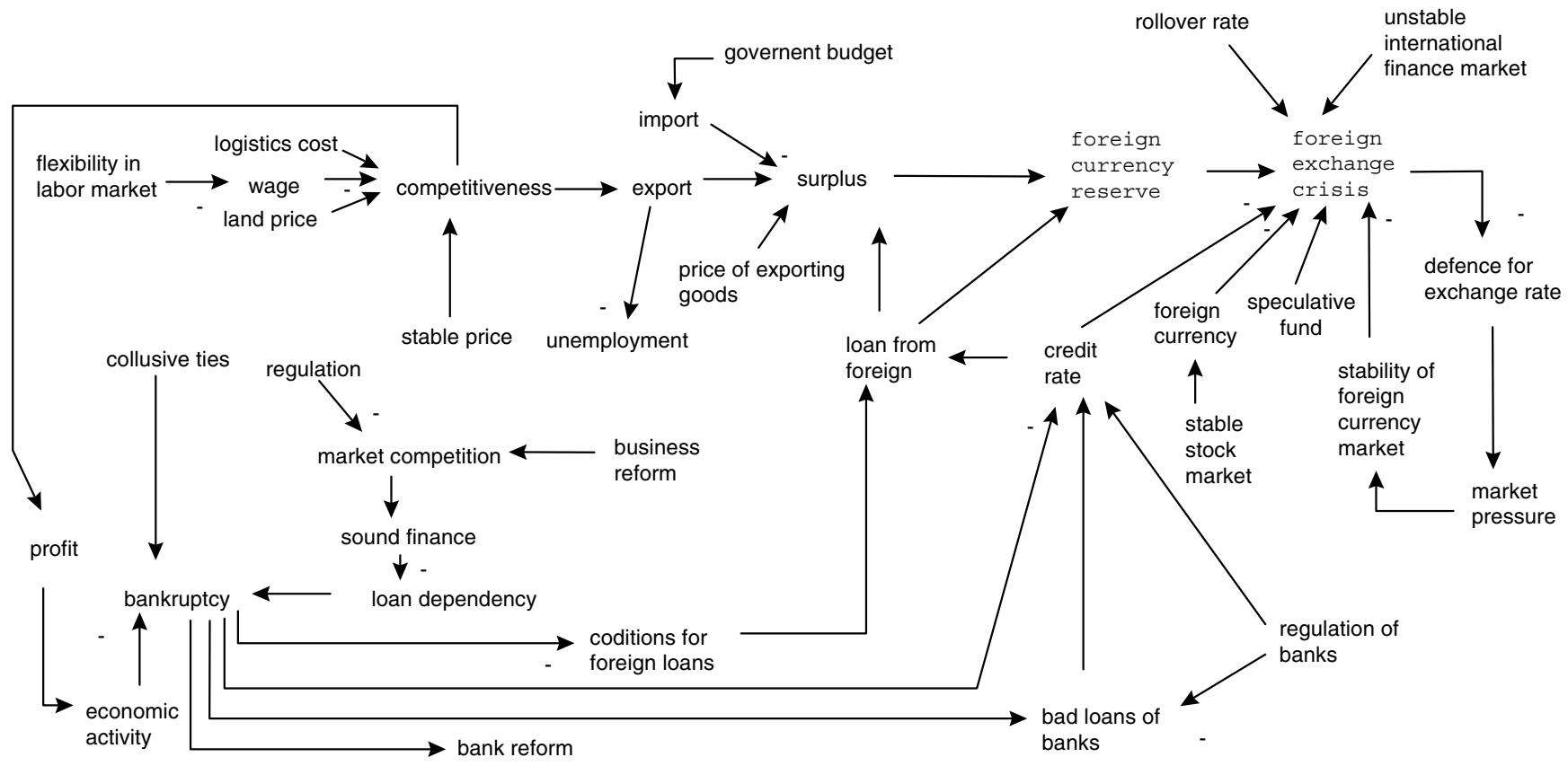


Figure 6. Cognitive map of past Deputy Prime Minister of Korea in 1997 and 1999

One can also guess that the feedback misperception might arise from the narrow jurisdiction of Prime Minister. Because Prime Minister has short range of jurisdiction than the President, the cognitive map of the former lacks feedback loops presented in that of the latter. This conjecture also cannot be accepted. Before the financial crisis, Prime Minister had complete jurisdiction over the economic policies in Korea. After the financial crisis, President Dae Jung Kim abolished the position of Prime Minister and take the role of Prime Minister himself. This means that they have same jurisdiction at least over the economic policies.

This contrasting difference between misperception and abundance of feedback loops can be attributed to the personal ability in systems thinking. Also one can consider another possibility. This difference might come from different backgrounds of both policy makers. The past Prime Minister is an economist, and most economists pay little attention to the feedback loops. On the other hand, President Dae Jung Kim suffered severe oppression during 30 years, and his suffering might nurture his strategic feedback thinking.

Systems thinking of President Dae Jung Kim can be found not only in the abundance of feedback loops but also from his internal attribution of causes of financial crisis. He declared that the causes of financial crisis is internal rather than external. And he argued if we correct the internal causes of financial crisis, we can overcome it. In the following excerpt, he argues that the crisis is a man-made disaster. And it is clear that the man here indicates past leaders of Korea not foreigners.

“Legacies of the past continue to block our efforts. Those who grabbed power in the past had collusive links with business, controlled financing and indulged in corruption and injustice. As a result, all segments of society suffered while international competitiveness deteriorated. In this respect, the foreign exchange crisis was definitely a man-made disaster. We must determine its cause and learn a lesson for the future (from the speech of the President Dae Jung Kim).”

## **6. Propositions for Discussions**

The causal map analysis of President Dae Jung Kim showed that policy makers can exploit systems thinking effectively. It follows naturally that one should not give up efforts toward learning and training systems thinking for policy makers. Previous findings for general tendency of feedback misperception must be interpreted as indicating the necessity of learning systems thinking not as cynicism against its education.

While analyzing the statements of President Dae Jung Kim that are longer than 1,000 pages, I have encountered many interesting phenomena. Although those phenomena cannot be explained logically nor generalized until now, I believe, listing them will help future discussions on the causal map analysis of policy makers.

***Proposition 1:*** Policy makers tend to pay much attention on the positive feedback loops. This tendency can be observed from the causal map of President Dae Jung Kim. His policy direction has been determined by the positive feedback loops rather than negative ones as discussed in section 4.

**Proposition 2:** Policy makers tend to ignore the negative feedback loops. Policy makers tend to regard the negative feedback loop as natural mechanism, while consider the positive one as artificial device. Even President Dae Jung Kim seemed to ignore the negative loop effects of economic recovery in the end of 1998 when he expressed pride in his performance.

**Proposition 3:** Policy makers tend to use open loop thinking in devising policy measures. Policy makers seem to use stimuli-response paradigm in devising policy measures to solve policy problems. President Dae Jung Kim referred a lot of policy measures for overcoming the crisis, but only a portion of them is related to the feedback loop. Especially most policy measures for lessening unemployment problem are introduced without considering the feedback loops.

Above propositions are controversial. And I believe that we can get a lot of insight from discussing above propositions. Are there fundamental asymmetry between positive and negative feedback loops? Firms may be get into the troubles because they pay asymmetric attention to the positive feedback loops and ignore the negative ones. On the contrary, we may conjecture that asymmetric attention to the positive feedback loops might be justified in that positive a feedback loop brings about more serious problems than the negative one does.

## 7. Conclusion

In this paper I suggested that the causal map of policy makers (CMPM) might be used as an effective method for investigating mental maps of policy makers and for understanding reasons determining policy directions. System scientists have pointed out that the causal map alone can enhance our understanding of complex social systems (Coyle 1998, Hall 1994, Eden 1988). In the same manner, we can say that the causal map of policy makers give much insights into the nature of policy makers.

In this paper I also argued that the feedback misperception tendency must not be misperceived. As long as we believe that policy makers in public or private area are 'not idiots nor genius (NING)', our research must go beyond previous findings of feedback misperception. Our next questions will include following ones. Why policy makers differ in their perception of feedback loops? Why a policy maker shows different attitude to different feedback loops? From the abundance of feedback loops in the cognitive map of policy makers, can we assume their proper use of them? By answering these questions we can learn how to employ systems thinking strategically.

## References

- Axelrod, R. (1976) *Structure of Decision: The Cognitive Maps of Political Elites*, Princeton University Press
- Bonham, G.M., M.J. Shapiro, and J. Tremble (1979) The October War: Changes in Cognitive Orientations Toward the Middle East Conflict. *International Studies Quarterly* 23, 3-44.
- Bougon, M., K. Weick, D. Binkhorst (1977) Cognition in Organizations: An Analysis of the Utrecht Jazz Orchestra. *Administrative Science Quarterly* 22, 606-639.
- Brehmer, B. (1990) Strategies in Real Time, Dynamic Decision Making. In R. Hogarth (ed.) *Insights in Decision Making*, University of Chicago Press, 262-

- Coyle G. (1998). The practice of system dynamics: milestones, lessons and ideas from 30 years experience. *System Dynamics Review* 14, 343-365.
- Eden, C. (1988) Cognitive Mapping. *European Journal of Operational Research*. 36, 1-13.
- Eden, C. (1994) Cognitive mapping and problem structuring for system dynamics model building. *System Dynamics Review* 10, 257-276.
- Hall, R. I. (1994) Causal policy maps of managers: formal methods for elicitation and analysis. *System Dynamics Review* 10, 337-360.
- Maoz, Z. (1990) *National Choices and International Processes*, Cambridge University Press
- Paich M., J.D. Sterman (1993) Boom, Bust, and Failures to Learn in Experimental Markets. *Management Science* 39, 1439-1458.
- Sterman J.D. (1989) Misperceptions of Feedback in Dynamic Decision Making. *Organizational Behavior and Human Decision Processes* 43, 301-335.