FEEDBACK AND DELAY IN PLANNED ECONOMY SYSTEM

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Summary: Slow feedback and passive control are the major problems in pure planned economy country. In this paper we compare two kinds of economy control forms which exist now: planned control and market control, prove why our country take economy reform as the main work in the Seventh 5-Year Plan and show what function these reforms will have. The method is based on system dynamics. Simulation tell us: the difference between planned economy and market economy consists in their feedback control form, if we can combine the advantage in market control with our system, our economy system will be improved greatly.

INTRODUCTION

After completing "Sixth 5-Year Plan", chinese are ambitious to begin their seven 5-year plan. According to "The Report about Seventh 5-Year Plan" of our country the main work in this period of time is still economy structure reform. It includes: enlarging the right of enterprise, developing product market, reforming price system, strengthening indirect control, etc. As a matter of fact the effectiveness of these reforms has been assured, but in theoryit is still necessary to show the fault of old economy structure and prove the necessity of reform. It is my main goal in this paper to conside dynamicly the influence of different economy control to economy construction and show that these reforms are how to react on economy system.

In dynamics the difference between planned economy and market economy consists in their feedback control forms. The former emphasis macrocontrol of country plan and the latter emphasis microcontrol. In fact pure planned economy or pure market economy can not control the system running very well. Therefore, based on the macrocontrol, planned economy countries are strengthening their microcontrol, i.e, introducing a series of economy reforms. At the same time market economy system also use partly the country control or company monopoly control. All of these, according to dynamic theory, have the same objective: controling every inflow variable and outflow variable to make the system work most effectively.

The Simplest Enterprise system

In the pure planned economy country its feedback form is similar to that in enterprise. It means,all decision must be made by top leader. All information can not influence the decision unless it has been feedbacked to top leader.Therefore by means of enterprise feedback system we can get similar information about planned economy system.

The simplest enterprise system flow diagram is:

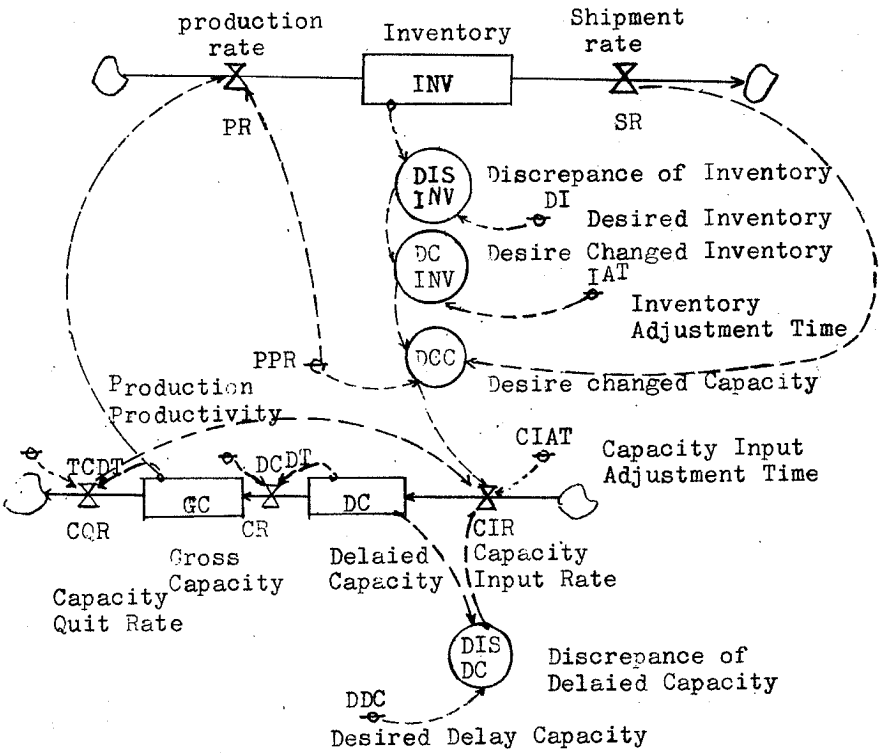

Fig. 1 Enperprise system flow diagram

Let C CIAT=2
C IAT=2
C DCDT=2
C DT TCDT=10

Its Simulation result is showed in Fig.2
For this model we may find from the simulation result that inventory can reach equilibrium after some time,but this time is somewhat long because the Delaied Capacity level is introduced and there are no any indirect feedback control.

The Difference Between Planned Economy System and Enterprise System

Because the similarity between planned economy system and enterprise system, many decisioners used the control form of enterprise system to planned economy system simply and didn't consider the difference between them. Now we analyse their main difference:

1. The number of product in a planned economy country is much more than that in enterprise and among these products most of them belong to mid middle product. We must therefore divide them with end product when we need to determine all product demand. In order to complete it, we need to use the input-output method. But planned economy system is so large that there are no possibility to record data, order information, and compute related matrix.
2. Large system has more levels than small enterprise system, its feedback has bad sensitivity and it can not control the system effectively.

3. Large system can allow larger discrepance, but it is easy to produce large oscilation due to its bad sensitivity.

In this section we use enterprise system expressing these factors' influence after making some change. We add a SMOOTH function before the inflow rate variable CIR(Capacity Input Rate) and increase the delay time DCDT to 4. The simulation result is showed in Fig. 3.

This result tell us that only because aSMOOTH function is introduced and the delay time is changed from 2 to 4, inventory will never reach equibilium and system character become much worse than before. In actural our planned system has more this"smooth"and the delay time is longer.

Improved planned economy system

Above difference 2,3 are based on simple product feedback control, but difference 1 show the complex in large system. Because there are middle products, we must use input-output matrix to consider the relation between middle and end product. Its relation equation is: $Q=(I-A)^{-1}Y$ (here Q is gross product and Y is end product, I is unit matrix) But it is impossible to obtain matrix A(related matrix) due to above difference1, so that matrix Q is also impossible. Therefore our long rangeplanning is very unthinkable. the larger the system is, the lower its precision.

Facing these facts, we have no any other way except strengthening its inner control. Old strategy "Take Steel as the key link", "Take Grain as the Key Link" have proved to be uneffective. The reason is that we did notbase our economic strategy on economic law, did not determine the gross product's capacity investment according to end product demand, therefore aim discrepance is unaviodable.

When macroplan can not meet the actural need ,we must improve our system's feedback sensitivity in order to improved its control ability,strengthen indirect control of subsystem and add middle decision, so that this economic system correspond with actural need gradually.

In the INTRODUCTION section we have told you that our main work in the Seventh 5-Year Plan is economic reform:enlargging the right of enterprise,developing product market,reforming price systemand strengthening indire ct control.In fact all of these reforms are according to economic law and system principle.Now we introduce these reforms to above enterprise system in order to get some information,simulation result is showed in Fig. 4.

Based on these reforms,some changes must made in our program.we use TABLE function to express PPR (Production Productivity) and to expressdemand elasticity,i.e SR(Shipment Rate) in this model.

These changes are:

```
A    PR.K=TABLE(TAPR,FDIINV.K,.7,1.4,.1)
T    TAPR=.875/.89/.92/1/1.1/1.18/1.22/1.25
A    FDIINV.K=DI/INV.K

R    SR.KL=CSR*EFFSR.K
A    EFFSR.K=TABLE(TSR,FDIINV.K,0,1,.2)
T    TSR=0/.4/.7/.83/.91/1
```

CONCLUSION

After introducing some reforms for the planned economy system,we get good system character.It is because the system feedback sensitivity and indirect control ability have been improved.But it do not mean we have solved all problems.In our model demand(i.e SR Shipment Rate) is considered as a constant,therefore inventory can reach equilibrium easily.If we consider demand as a variable,changed according to actural need,this system will become more complex and more problems will need to be solved.

In this paper we do not discuss the problem further.It has been included in my another paper "Input-Output Dynamic System Analysis of planned Economy Country".The main subject in that paper is about the decision of investment policy.

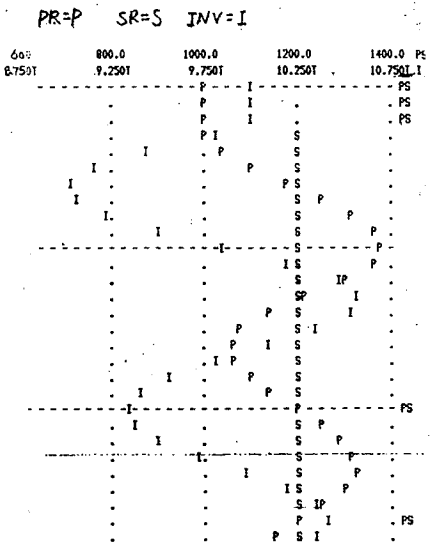

Fig. 1

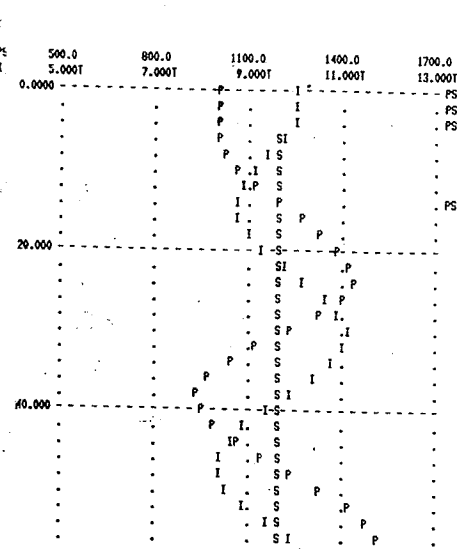

Fig. 2

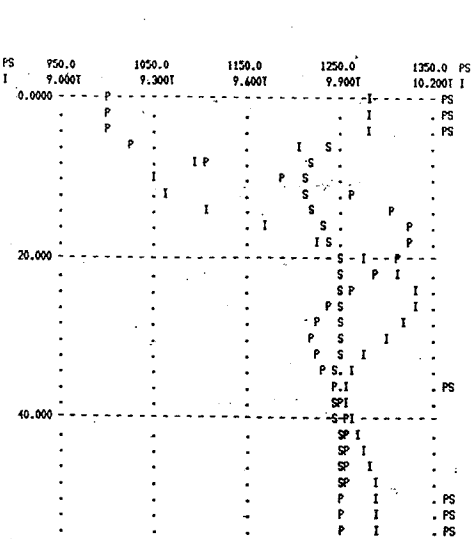

Fig. 3