

The Influence of Rising Management Cost on the Failure of the Chinese Agricultural Collective

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Abstract

The design of the traditional Chinese agricultural collective followed the basic pattern of modern enterprises. The organization of the production system was based on consolidated land, capital equipment and labor. The government owned the land and was the sole decision-maker in large-scale investment. Supervisors were appointed to monitor farmers' work effort. The farmer was allocated his share of the production according to his relative labor input. This production system was successful during the 1950s, stagnated in the 1960s and finally collapsed in the late 1970s. A system dynamics model is built to examine the failure of the system. Through experimentation with the model it is demonstrated that the decline of the collective work system was due to the rising cost of maintaining the incentive system. The study provides evidence that the principalship, monitoring and farmer organization structure was not cost effective in maintaining a labor intensive agricultural production system.

Key words: Chinese agricultural collective, production organization, cost monitoring, work effort, System Dynamics model.

Problem definition

During the 1950s the Chinese government organized the agricultural collective system along similar lines as a regulated monopolistic enterprise structure. The organization of production was based on consolidated land, capital equipment and labor. The government owned all land and was the sole decision-maker for large-scale investment. Potential loss due to risk in decision-making was greatly reduced since all production was purchased at a guaranteed price. The only production management cost was the monitoring cost. Since farmers were guaranteed land and work, they tended to shirk at work. Supervisors had to be selected to monitor farmers' work effort. The monitoring cost was expected to be small compared to the gains from scale economies and the cost saved from the reduction of risk. However, this system could not be sustained. The main reason was that it was very costly to maintain a reasonable level of work effort for both supervisors and farmers. The monitoring cost kept on rising. The system did not provide an effective means to perceive and act on the rising cost. This rising cost finally led to extreme low efficiency of production and collapse of the production organization.

A model of the Chinese agricultural collective system

Organization structure in the model

According to Alchian and Demsetz's theory of enterprises [1972], the organization of collective agricultural production in China can be regarded as an enterprise system. Land is owned by the

government. Large-scale fixed capital investment is carried out by the government. Production is carried out with consolidated land, capital equipment and farmers. The only factor outside the direct control of the government is the farmers' level of effort. Therefore, supervisors are selected from the farmers to monitor the farmers' level of effort. The supervisors collect information on the actual work farmers contribute in order to pay them back commensurably. Also, the presence of the supervisors reduces the farmers' tendency to shirk.

The incentive mechanism in the collective system

Within the system incentive is given to two groups, the supervisors and the farmers. The farmers' work effort is stimulated by the intensity of monitoring and by income level [Hu 1995]. The effectiveness of monitoring, however, is influenced by employment security [Shapiro and Stiglitz 1984] and the production lead time [Lin 1988]. The worker's decision to not shirk is the opportunity cost arising from the penalty for shirking. The greatest opportunity cost for the farmer is unemployment. Because farmers are guaranteed access to land and because there is no possibility for them to lose their jobs, the effectiveness of the supervisors is moderated. Agricultural production lead time is long and production is influenced by stochastic factors. It is, therefore, difficult to measure the actual work that farmers contribute. More supervision is needed to maintain the desired level of work effort than in other non-agricultural enterprises.

The work effort of supervisors is generally very difficult to monitor [Zhang 1995]. Under the collective system the supervisors are also guaranteed a job. The greatest opportunity cost for supervisors is to be returned to the farmer workforce from whence they had originally come. The efforts of the supervisors are not great. In order to stimulate their work effort, they are given certain political resources¹ for their own education and to influence the farmers. When supervisors increase in number, the conflicts between them also increase and less effort is allocated to monitoring work. The work effort of supervisors is then influenced by wage payment received, political resources and the relative ratio of supervisors to farmers.

Resource allocation and the cost of management

The production of the collective is first allocated to political resources. The remainder provides the income for both farmers and supervisors. The total cost of monitoring is the sum of political resources and the total wage payment for the supervisors.

The structure of the model:

Figure 1 shows the structure governing the performance of the collective system. There is one positive feedback that leads to growth of production. When production rises, the gap between the desired production of the planner and actual production narrows. Fewer supervisors are needed to monitor farmers' work effort. Supervisors are therefore shifted back to the workforce of farmers and production consequently rises. However, there are two main negative feedback controlling the growth of production. First, when the gap between the planners' desired production and actual production narrows. Fewer political resources are allocated for supervisors' use. And the farmers' work effort therefore erodes. Second, when supervisors are shifted back to the workforce of farmers, monitoring intensity declines and farmers' work effort

is reduced. It follows that the performance of the system depends on the effectiveness of the supervisors which in turn is a function of the cost to stimulate supervisor work effort.

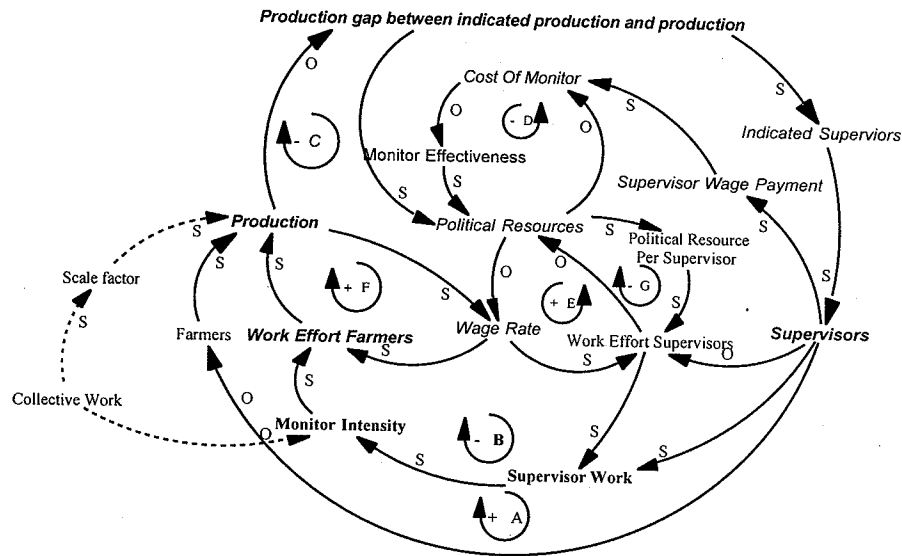


Figure 1. Feedback loops governing the production process of the collective system

Based on the feedback loop analysis, a formal model was built. Figure 2 shows the overall model structure. The model is composed of three sectors, (1) the resource allocation sector, (2) the work effort of farmers and supervisors sector and (3) the production sector. Figure 3 gives the simulation result.

Model Behavior

The model is initially set at equilibrium. A step function is applied to the scale factor in the applied to normal monitoring intensity. The simulation demonstrates that production increases when the collective policy is implemented. The initial increase is due to gains from scale production. However, farmers' work effort diminishes greatly since it is possible to shirk in collective work. Perceiving that farmers are not performing as expected, the government designates some farmers as supervisors. Political resources are allocated to give incentive to the supervisors. The number of supervisors increases and supervisors' work effort increases. However, farmers' work effort does not much increase. Therefore, more supervisors are designated and more resources are allocated to them. When more supervisors are selected, conflict among them also increases. Supervisors tend to allocate more time to personal political maneuvering. The work effort for monitoring the farmers decreases. Then additional political resources are allocated to stimulate them. The remaining resources for payment for work is reduced and the farmers' work effort tends to decline. The simulation run shows that farmers'

work effort does not respond much to the increase of supervisors. The relative intensity of monitoring rises. During the entire period the cost of monitoring continues to rise. However, this indicator, i.e., the cost of monitoring, yields weak influence over the decision-making process.

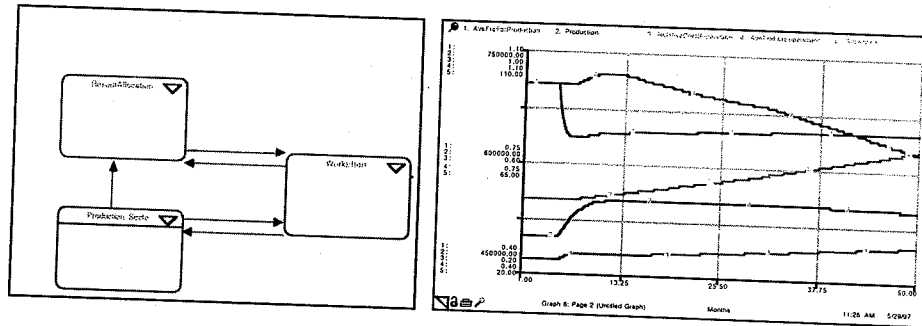


Figure 2. Structure Map of the Model Figure 3. Base run behavior

The cost of monitoring as an indicator in the production process does not modify the decision to promote more supervisors. The ineffective decision-making process still continues. When the number of supervisors increases, their work effort decreases and the farmers' work effort can not be improved. At the same time, the number of farmers decreases with the increase of supervisors and production declines.

Conclusion

Previous studies tend to emphasize the work effort of farmers. This model shows that in the Chinese agricultural collective system, there was no other means to boost production but to rely on supervisors to monitor farmers' work effort. The effectiveness of the supervisors is the determining factor of the system behavior. The simulation runs demonstrate that the lack of an effective means to maintain the work effort of supervisors has driven the decline of production.

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¹ Historically political resources consisted of resources for propaganda, mass meeting, etc.