Inner Mechanism of Corporations and How To Incite Their Vigour

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ABSTRACT

In order to understand the inner mechanism of corporations and incite their vigour, we create a model which provides us with the study of the development of new product R&D and advanced technology absorption, product life period, market promotion, the adjustment of the length of working time, productivity and hiring or firing of workforces.

INTRODUCTION

This is the further study of the paper Analyzing the Mechanism of Joint-Venture and Township Enterprises in China. The difference is that in addition to the analysis of mains factors such as market, productivity, control of production capacity and working time adjustment, we put emphasis on the research and development of new product and advanced technology absoption (include domestic and foreign technology) and on the contrast between the original model and new model. We aim at making a comprenhesive study of the inner mechanism of corporations during the process of corporations development.

THE FRAME OF THE MODEL

Figure 1 illustrates the frame of the model which is mainly made up of three parts: sales and ordering backlog, workforces hiring and productivity and the adjustment of the length of working time, the adjustment of production capacity, and the new product R&D and advanced technology absorption.

1. For the sector of sales and ordering backlog, on one hand, delivery rate determines revenue to sales which determines the number of salesmen through the market budget. On the other hand, according to the change of delivery delay, customer ordering rate is adjusted.

2. In the sector of production capacity adjustment,

production capacity is adjusted by the production capacity adjustment coefficient which is concerned in desired output and real average output.

3. Workforces are devided into skilled workforces (OWF) and unskilled wokforces (NWF). The NWF's hiring and firing are determined by designed workforces (DWF),workforces allowed by capacity facilities (AWF) and workforces (WF),etc.
Finally, delivery rete is influenced by the adjustment of the length working time (AWTL). AWTL is determined by the desired output (DOUT) and normal product (NPROD). Delivery rate (DR)is the product of normal product (NPROD) and AWTL.

4. In Figure 2, budget for new product R&D and advanced technology absorption (NPB) are devided into cost for new product R&D (INP) and cost for advanced technology absorption (INI).The concept of product life reriod says, generally, a product will go through three stages: R&D stage, market benifit stage (earlier period and high effect period) and withdrawing stage. But, there is exception.If it cannot be accepted by the market, it will jump over some of stages and be rejected by the market. For the corporation as a buyer of advanced technology, advanced technology absorpion will go over the R&D stage and go into the market benefit stage directly . Therefore, four level variables are NP, NP1, NP2, NP3. New product adaption to market (ADAPT) is determined by q, q1, q2, q3 which are proportions of NP, NP1, NP2 and NP3 over their sum, also by corporation technical level (BTS) which is determined by science & technology benefits (STR). Productivity is influeced by BTS and determined the average wage of workforces (AWAGE) which determines desired workforces (DWF).

BASE RUN

In the base run, we choose a type of corporations whose market share is lower and whose competition status is disadvantageous.

In the structure of the model, this is reflected that the backlog cannot meet the demand of production capacity, and that the number of appealed customers is lower and there exists hidden unemployment. But the corporation succeeds in adopting new product and advance technology.

The results is shown in Figure 33. The number of workforces declines at first, and then makes two S-shaped growth. The sign of workforces' hiring and firing rate (RWFHL) turns positive from negative at first so that the number of workforces at first. The proportion of NP1 over the sum of NP, NP1, NP2 and NP3 (q1) increases at first. After about one and a half year, it turns to go down. The proportion of NP2 over the sum of NP, NP1, NP2 and NP3 (q2) decreases at first because NP1 increses relatively. In about half a year, it turns to increase. In tow years it comes to its highest point which reflects that the R&D achievement and advanced technology products have been accepted by the market. Thus costomer ordering rate (COR) has an S-shaped growth. The adjustment of the length of working time (AWTL) also changes. At first it works in undertime changing from decrese to increase, and then it changes from work undertime to work overtime. At last, it decreases to a stable value in work overtime.

POLICY SIMULATION ANALYSIS

1.Contrast of Basee Run and The Model without R&D

We have discussed the model in which the sector of new product development and advanced technology absoprtion is not included. In this case, Hidden unemployment will be eliminated with half a year. The number of workforces declines at first, and goes up gradually. At last it inclines to the number of workforces allowed by the capacity facilities which will be made full use of. The sign of workforces' hiring and firing (RWFHL) turns positive from negative at first so that the number of workforces declines within half a year. Then the positive RWFHL makes the number of workforces an S-shaped growth.

To analyze the reasonableness of the behaviors above, we give a further discussion on hiring-firing rate from the point of management and decision.

When AWF is greater than WF:
(1). if DWF<WF<AWF, the programme to decrease the workforces is adopted. WF will incline to DWF;
(2). if WF<DWF<AWF, the programme to increase the workforces is adopted. WF will incline to DWF;
(3). if WF<AWF<DWF, the programme to increase the workforces is adopted. WF will incline to AWF;
When AWF is less than WF:

(4). if AWF<WF<DWF, the programme to decrease the workforces is adopted. WF will incline to AWF;
(5). if DWF<AWF<WF, the programme to decrease the workforces is adopted. WF will incline DWF;
(6). if AWF<DWF<WF, the programme to decrease the workforces is adopted. WF will incline to AWF.

To sum up all these programmes, if AWF>DWF, the manager choose the goal of workforces' hiring and firing which trends to DWF,if DWF>AWF, which trends to AWF.

In this case, coporation can improve some worse conditions,but it has no motive force to cope with other coporations.In the base run, things are different. Whether new products is developed and whether new product is accepted by market are very important to the existance and development of the corporations. The Figure 3 tells us the corporation succeeds in the development of new product and wins in the market because of the increase of the costomers ordering rate. Futhermore, the number of workforces is influeced not only by workforces allowed by capacity facilities (AWF) and desired workforces (DWF) but also by new production adaption to the market.

2.Contrast between the Base Run and the Run in which Product Refused by Market Figure 4 takes place when the new product is not accepted by the market. First, the corporation has to decrease the workforces and the adjustment of the length of working time decreases in work undertime because there exists hidden unemployment and the backlog cannot meet the demand of production capacity. In about half a year the proportion of NP1 over the sum of NP, NP1, NP2 and NP3 (q1) begins to decrease because the new product is not accepted by the market. After half a year again, q1 begins increase, this means that new input in R&D plays the role. So, the customers ordering rate (COR) has an S-shaped growth in these changes, q1 returns to the original level and does not surpass the original level. The adjustment of the length of working time (AWTL) will meet the production capacity and change up and down.

Contrast to the base run, we find out that whether the new product is accepted by the market is an important leverage to the success or failure of the corporation. In the base run, new product succeeds in market competition. The difficulties of the corporation, such as hidden unemployment and disadvantageous competition

status that the backlog cannot meet the demand production capacity and that number of appealed customers is lower, will be solved. Futhermore, the corporation will have an enduring moving force which is the real vigour of the corporations

3. OTHER TESTS

To analyze the relationship between the structure and behavior, we also conduct some policy tests such as proper budget proportion for new product R&D and advanced technology absorption, proper proportion between new product and ordinary product, productivity, etc.

CONCLUSION

In order to find out the way of developing of corporations, we conduct a series of policy tests to put forward comprehensive policies included as following:

1. The corporation should increase the input for new product R&D and advanced technology absorption. About 10% to 15% of the sales profits investing into the new product R&D and advanced technology absorption (include the technology import) will be better. From the analyses above, we have known the fact that new product R&D and advanced technology absorption are the best way to incite the vigour of the corporation.

2. There will be a proper proportion between the new product R&D and advanced technology absorption. About 60% to 70% of NPB may be suggested to input to the research and development of the new product, the others to advanced technology absorption.

3. Relex restrictions of staff mobility patrly or completely. Adjustment time for the staff mobility should be kept within three to six months. If the adjustment time is too short, it will be disadvantageous to the stability of the enterprise. If it is too long, it will be disadvantageous to the regular staff mobility.

4. Average wage of workforces should increase slowlier than prodictivity.Only by this way can enterprises develop quickly.

5. New product research & development and advanced

technology absorption should meet the need of real situation of market. Thus, the products will have a long life in the market benefit stage and the corporations will be given enduring impetus to incite their vigour. The stable and coordinative development of corporations depends on many other factors, but we believe that if above policies are adopted, these corporations will gain new vigour and their futures are prosperous. We sincerely hope that the results of study will be beneficial to the management and future development of this type of corporations.

* A research supported by State Natural Science Fundation of China

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2. Wang, Qifan and Xu, Bo. 1991. Proceedings of the 1991 International System Dynamics Conference: Analyzing the Mechanism of Joint-venture and Township Enterprises in China. System Dynamics '91: 646-655.

Appendix

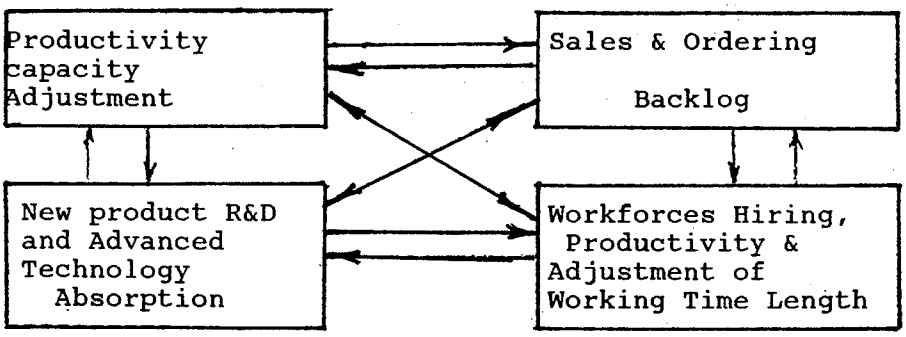
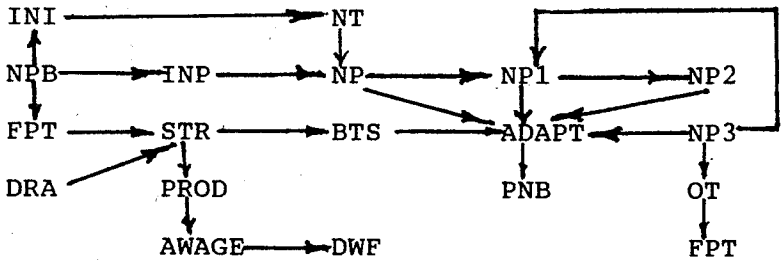


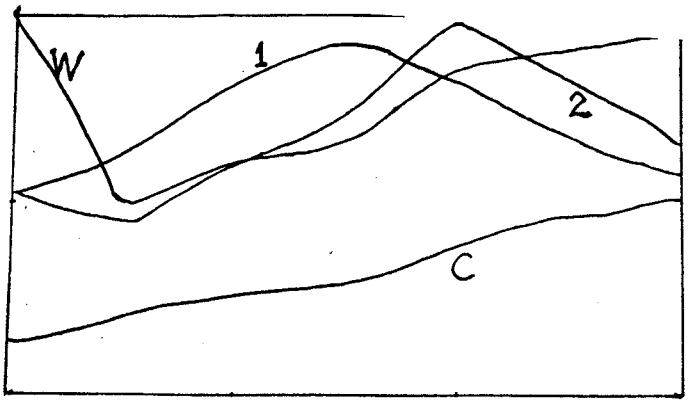
Figure-1 The model's frame



Notes:
NPB: Budget for new product R&D and advanced technology
INI: Cost for new product R&D
INP: Cost for advanced technology absorption
NT: Number of new product R&D items
NP: Number of advanced technology items
NP1: Number of products in earlier period of market benefit stage
NP2: Number of products in high effort period of market benefit stage
NP3: Number of products in elimination stage
FPT: und of now available technology
OT: Number of eliminated technology items
STR: Science benefit BTS: Technical level
ADAPT: new product adaption to market
PNB: Promotion ability of new product to market
DRA: Average production capacity
AWAGE: Average wage DWF: Designed workforces

Figure-2 Structure of New product R&D and Advanced Technology Absorption

W(150,350),C(0,400), 1,2(0.025,0.425)

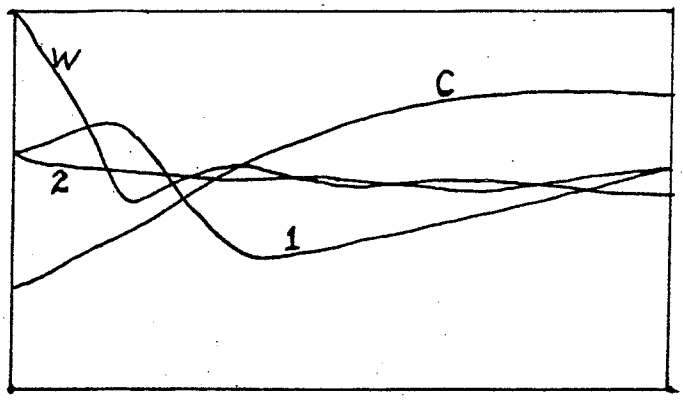


Notes:

C: Costomers Ordering Rate
W: Workforces
1: The Proportion of NP1 over the Sum of NP, NP1, NP2 and NP3
2: The Proportion of NP2 over the Sum of NP, NP1, NP2 and NP3

Figure-3 Base run

W(150,350), C(0,200), 1,2(0,0.4)



Notes:

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1: The Proportion of NP1 over the Sum of NP, NP1, NP2 and NP3
2: The Proportion of NP2 over the Sum of NP, NP1, NP2 and NP3

Figure-4 Behaviors for the product refused by market