Design of the Basic Data Structure of the Management Simulation Platform of Commercial Eco-sphere Sand Box

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Abstract. This article discussed what is the business eco-sphere sand table for simulation management, what are the core elements of it, what is the structure of it. Besides this article preliminarily answered the design ideas of the basic data structure and elaborated the logic of data flow of the new business eco-sphere sand table.

Introduction

With the continuous progress of information technology, the original ERP sand table platform, which is based on the single manufacturing enterprise, is unable to meet the current management simulation training of economic and management specialties of colleges and universities in China.

Concept and Connotation of this New Management Simulation Sand Table

New commercial eco-sphere sand table and original ERP sand table have high inheritance, but the former has a qualitative leap. One side, the commercial eco-sphere sand plate must also fully simulate all the core works of the enterprise; but the operation body of the new sand table is no longer only a manufacturing enterprise, but a group of highly related upstream and downstream enterprises. These enterprises form a stable value chain, a supply chain around the core enterprises, that is, it is a commercial ecological environment.

So the commercial eco-sphere sand table constructed in this paper provides a competitive "commercial eco-sphere" simulation platform. Each "commercial eco-sphere" consists of a scientific and technological innovative enterprise, a manufacturing enterprise and an agent distribution enterprise. The structure of the "commercial eco-sphere" is shown in Figure 1.
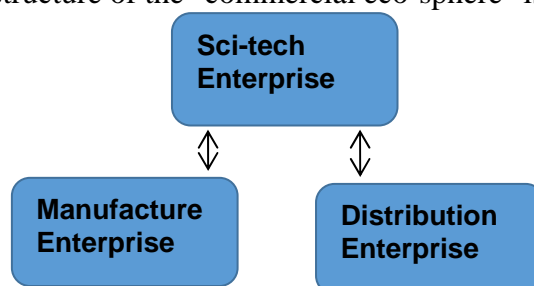

Figure 1. The structure of the "commercial eco-sphere"

In addition, this system also contains the "Task Environment Unit", such as talent market, trading market, raw material supplier, third party logistics and bank, which makes it a dynamic business social practice system, see Figure 2.
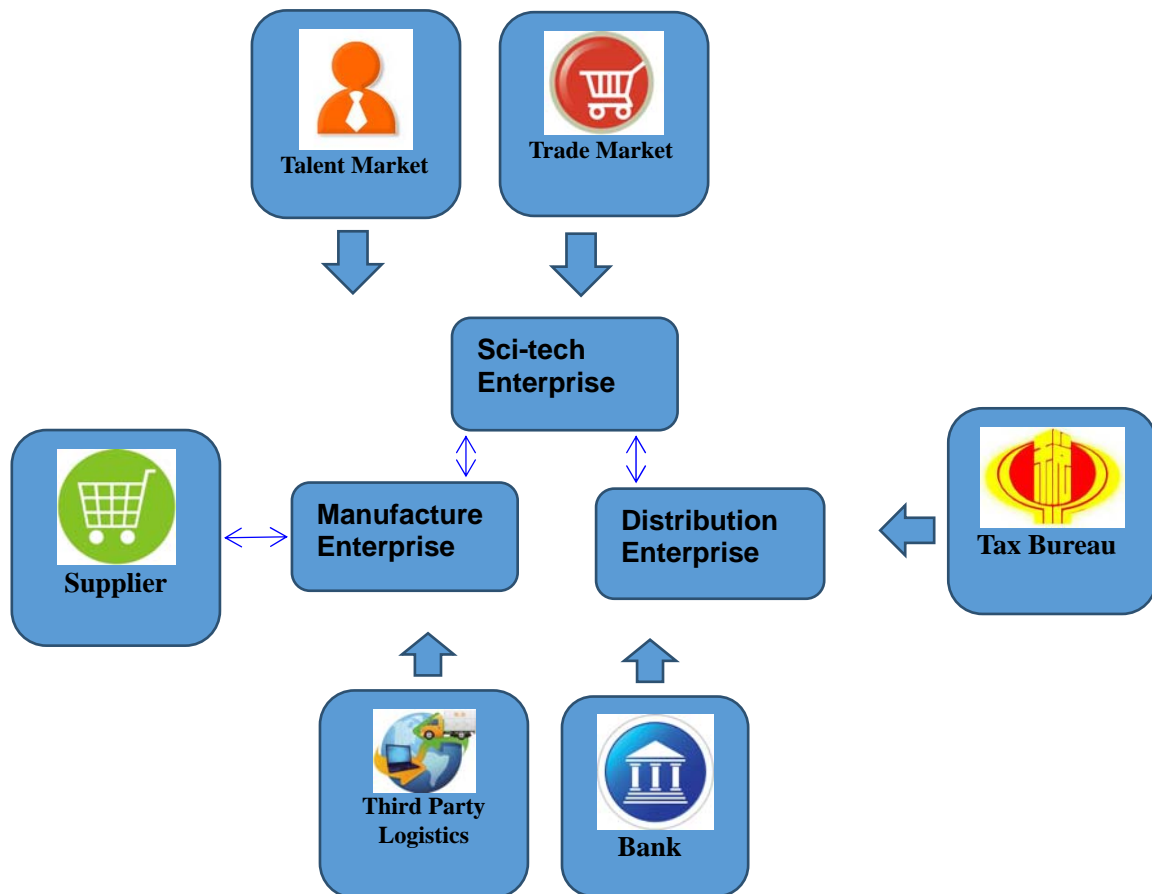
Figure 2. Commercial eco-sphere simulated by the commercial eco-sphere sand table

Data Model Design of Commercial Eco-sphere Sand Table

The business eco-sphere sand table` simulated object is also the enterprise, but its simulated object changed into a "supply chain" from a manufacturing enterprise. So its data model design is necessary to maintain the basic attributes of the general enterprise and take into account the differences between different enterprises.

Basic Attribute of Enterprise

Currently the basic financial statements of modern enterprises are the ideal tools to fully and accurately reflect the state of an enterprise. So our business eco-sphere sand table cheese these tables as the basic data structure(As shown in table 1-3).

Table 1. Comprehensive cost table

Enterprise Name		
Item	Sum(M)	Remarks
Rents of fixed assets		
Storage cost		
Advertising expenses		
Administrative fee		
……		
Business Information fee		
Others		Liquidated damages
Total(M)		

Table 2. Profit statement

Enterprise Name		
Item	Sum(M)	Remarks
Sales income		
Direct cost		
Other income		
Gross profit		
Comprehensive cost		
Profit before depreciation		
Depreciation	( )	Fixed assets
Profit before deducting interest		
Financial cost		Interest of long loan, short loan or special loan
Profit before rebate		
Sales rebate		Negative number
Accept rebate		Positive number
Pre tax profit		
Tax		
Annual net profit		

Differences in Different Enterprises

In this model, The division of labor between the three enterprises in the value chain is different. Therefore, the difference in the division of labor of the enterprise must be reflected in the design of the data structure.

Differences in the Comprehensive Cost Table

The "Rents of fixed assets" item of the manufacturing enterprises include the rent of the plant and the warehouse. It is responsible for the production task, so it has the "Maintenance cost of production line".

Sci-tech enterprises need to advance a part of the production start-up funds to the manufacturing enterprises, so it has the "Production intention fee" item. It bears the task of research and development and certification of new products, so it also has the "Product research and development fee", "Product certification fee" items. At the same time, it dominates the market strategy, therefore it also has the "Market opening fee", "Market maintenance fee" and "Market activity fee" items. Finally, it can set up a network marketing center, so it has a "Network center management fee" item.

Agent distribution enterprises need to apply for the sci-tech enterprises to obtain the right of selling the products, so it needs to pay "Product agent fee". Besides it has "Shop management fee" and "Shop building fee" items.

Differences in Profit Statement

The manufacturing enterprise has the "Work income" item, whose data comes from the "Production intention fee" item in the comprehensive cost list of sci-tech enterprises.

The sci-tec enterprise has the "Agent income" item, whose data comes from the "Product agent fee" item in the agency's comprehensive cost list.

Differences in the Balance Sheet

The "Other assets" item of the manufacturing enterprise is "Work in process" item. Its "Fixed assets" item includes "Workshop", "Warehouse", "Machine equipment".

Sci-tech enterprises have no "Other assets" item, because we assumed it is a light asset type enterprise, which just rents office spaces and warehouses.

Agent distribution enterprise have no "Other assets" item. It has no "Accounts receivable" item. Its "Fixed assets" item is "Warehouse" item.

The Initial Data Flow of the Commercial Eco-sphere Sand Table

In our commercial eco-sphere sandbox model, the initial year was set to only one working quarter (three months).

The Logic of Data Flow and Hypothetical Conditions of Process

Data Flow Logic of Enterprise Reports

Final "Grand total" data of the comprehensive cost sheet will be transferred to the "comprehensive cost" item of the profit list. Final "Grand total" item of the profit statement will be transferred to the "Comprehensive cost" item of the balance sheet.

In addition, the relationship between "Last year's profit retention", "Net profit for the previous year" and "Profit retained in this year" in the balance sheet are as follows:

profit retained in this year = net profit for the previous year + last year's profit retention

Three Hypothetical Conditions in the Initial Year

Hypothesis 1 The demand for P1 products in the market is 7 boxes, so the agent distribution enterprise will get a 7 boxes order in the sales conference and get 35M.

Hypothesis 2 In the quarter before the initial year, the sci-tec enterprise has booked 10 boxes of P1 from the manufacturing enterprise. So in this quarter, the manufacturing enterprise needs to deliver 10 boxes of P1 by order.

Hypothesis 3 In the quarter before the initial year, the agent distribution enterprise has ordered 10 boxes of P1 products from the sci-tec enterprise. So in this quarter the sci-tec enterprise needs to deliver 10 boxes of P1 by order.

Results of the Data Flow in the Initial Year

We take the manufacturing enterprise as an example. After the initial year, the assets and liabilities of this enterprise are shown in Table 3.

Table 3. Balance sheet of a manufacturing enterprise

Manufacturing enterprise 1					
Item	Time		Item	Time	
Current assets	Last year	This year	Liabilities	Last year	This year
Cash	73M	20M	Short loan	20M	20M
Accounts receivable	20M	20M	Long loan	60M	80M
Merchandise inventory	30M	40M	Accrued tax	1M	1M
Work in proess	40M	40M			
Goods in transit	0M	0M	Special loan	0M	0M
Total current assets	163M	120M	Total liability	81M	101M
Fixed assets	Last year	This year	Owner's equity	Last year	This year
Workshop	0M	40M	Shareholder capital	80M	80M
Warehouse	0M	20M	Profit retention	4M	11M
Machinery equipment	9M	8M	Annual net profit	7M	-4M
Total fixed assets	9M	68M	Total owner's equity	91M	87M
Total Assets	172M	188M	Total liability and owner's equity	172M	188M

Summary

The study shows that the new ERP sand table is highly inherited from the original ERP sand table, but from the perspective of social division of labor it completely breaks through the ideological limitations of the original sand table.

Reference

[1] Shijun Tang, Bingxue Chen, Weiping Chen, The Study on the Construction of a Commercial Society Simulation Game based on Science and Technology Innovation, ITME2017, P344-347.