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Swarm Platform Simulation of the Impact of Enterprise Organizational Innovation on Dynamic Core Competence

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Abstract:

At present, facing the great impact of the rise of knowledge economy and global economic integration, in order to obtain sustainable objective competitive advantage, enterprises must carry out relevant dynamic updating and continuous evolution of their core competence, which will be beneficial to promoting the dynamic core competence of enterprises. With the passage of time, it constantly updates and develops new competitive advantages of enterprises. This dissertation anatomizes the internal mechanism of the emergence of enterprise dynamic core competencies, constructs the upper limit model and three-dimensions model of the emergence of enterprise dynamic core competencies, particularly describes the phenomena and the process about appearing, constructs the SEM model of corporate organizational innovation to organizational effect and selects several High-end equipment manufacturing industry corporates to research. Using swarm platform to simulate the process of organizational innovation promoting the emergence of dynamic core competence, combined with complex adaptive system theory, this dissertation simulates the impact of enterprise organizational innovation on the emergence of dynamic core competence in super competitive environment by using java simulation program based on swarm platform, analyzes the results, and provides strategies to promote the emergence of enterprise dynamic core competence.

***Keywords**: Dynamic core competence of enterprise, Organizational innovation, Emergence, Swarm simulation*

I. SIMULATION PLATFORM BUILDING

1.1 Foundation of Swarm Platform

Swarm is the multi-agent simulation tool developed by Santa Fe Institute (SFI) to facilitate researchers to analyze the Complex Adaptive System (CAS). CAS consists of some free agents, whose actions are interactive. Design conception of swarm is that a series of independent agents interact through independent

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events, and the generated actions impact the substances of themselves and other agents. In different systems, different agents can be designed. Two languages can be used in Swarm, Object-C and Java. Java is simple and easy to learn, and completely oriented to objects, with cross-platform and transferable characteristics, as well as advantages of sound development tools and documents supporting [1]. With the increasing wider application of Java language, Swarm has gained wider attentions.

Swarm provides the object-oriented framework, which is used in researches on actions of interactive agents and the other objects in the simulation, without any restrictions on the interactive modes among models and model factors, and free from the problems in the aspects of data processing, user interface and other pure software work, and programming [2]. Swarm can simulate any physical system, economic system, or social system, and therefore, has gained wide attentions of domestic and overseas experts and scholars in the field of economics, finance, sociology, biology, ecology, military affairs, physics, and computer science, etc.

The two main parts, which are mostly important in the research on Swarm simulation program design, are:

(1) Swarm (Model Swarm). Model Swarm consists of two main components: ① a series of Objects (Agent); ② Action of the objects.

(2) Swarm (Observer Swarm). Observer Swarm also consists of objects (experimental instruments), actions schedule and a series of inputs and outputs. Actions schedule of Observer Swarm mainly aim to drive date collection (VarProbes, MessageProbe), i.e. read out data from model, and draw up ProbeMap. Inputs of Observer Swarm are configurations for observing tools, e.g., what kind of ProbeMaps generated. Outputs are observing results, and the specific situations are shown in the following Fig 1.

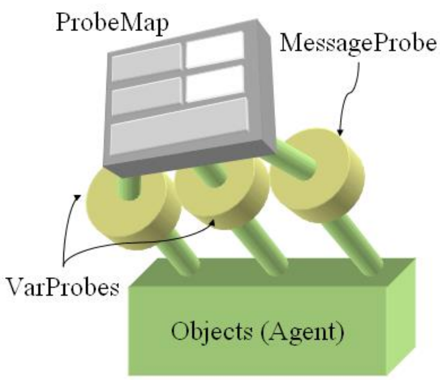

Fig 1: Swarm framework model

In this simulation experiment, firstly, basic contents of the enterprise are built up, and then abstraction of every indicator owned by the enterprise is made. Every indicator is expressed by a variable, and some indicators derive from other indicators. In the simulation experiment, every enterprise is one object (Agent), and they have their own decision rights and decision actions. There are four documents in all:

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Enterprise.java, ModelSwarm.java, ObserverSwarm.java, and Start.java.

1.2 Modeling Process of Repast Platform

Repast (Recursive Porous Agent Simulation Toolkit) is an agent-based simulation framework developed by Java. On the basis of many designing conceptions derived from Swarm, Repast has developed a Swarm-class simulation software framework. Repast was initially developed by the Social Science Computing Laboratory of Chicago University, and then maintained by Oregon National Laboratory for a period of time, by now it is under the management of a nonprofit organization consisting of government, education circle, and industrial organization members [3]. The core part of Repast 3.0 is a kernel service based on agent modeling, supporting three implementation platforms: RepastJ in Java platform, Repast.Net in Microsoft .Net framework, and RpastPy supporting Py script language, therefore, it supports three programming interfaces of Java, Python, and .Net. Advanced models can be programmed by Java in RepastJ, or by C++in Repast.Net. Repast has many class libraries to create, run, show, and collect agent-based simulation data, and also provides inner adaptive functions, such as, genetic algorithm and regression, etc.It includes many templates and examples, with many characteristics such as supporting inner systematic dynamic models and completely parallel discrete events operation [4].

The model herein is programmed by Java language. Firstly, model structure is analyzed, and the model consists of two agents, i.e., the government and enterprises, besides, an innovation spaces is defined and the classes of agents are projected into the innovation space.

II.SIMULATION CONTENTS AND PROCESS

The Swarm simulation in the research takes high-end equipment manufacturing enterprises as the agents, and objects consist of two parts, i.e., variables describing specific information of agents, and methods describing activities of enterprise agents. Describing the variables for organizational innovation states of high-end equipment manufacturing enterprises and methods of actions (decisions) of agents of high-end equipment manufacturing enterprises indicators selection, is actually the selection of 35 indicators.

Model Swarm creates 10 enterprises, and defines time limits for every enterprise decision action. As to the decisions within every time, the changing rules of every indicator of every enterprise are also defined in the enterprise decision actions, and the mutual impacts among enterprises are shown in the Model Swarm. Model Swarm is like a stage, and enterprises perform competitive actions on it. Many enterprises are created in the method of build objects () of Model Swarm, as well as the decision actions of every enterprise within the same time.

In the experiment simulation, and according to the required items of output results (17 in total), every indicator for the enterprise is quantified. And output indicator value is determined according to the weight of every indicator to the output indicator.

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Observer Swarm probes the results of decision actions of enterprise generated within every time series, reads out the data from Model Swarm, and probes the results of decision actions of every enterprise, mainly covering the final 17 output indicators. Not only the variables, but also the methods are probed, and then changing situation of results is shown in the plots graphs [5].

In the research Swarm simulation is carried out in the highly competitive environment, 10 mutually competitive high-end equipment manufacturing enterprises of same class are selected randomly by the computer. Observer Swarm observes the output indicator, and determines the dynamic core capability state of high-end equipment manufacturing enterprises. In the competitive condition, and according to the connotation for every indicator set above, it is easy to get $D_j = \delta_{ij} \operatorname{sgn} \Delta x_i + \omega_{ij}$, where sgn is the symbol function, δ_{ij} and ω_{ij} are got in the simulation process by Model Swarm.

In Swarm the ‘sugar scape’ model provides the methods to generate new high-end equipment manufacturing enterprises (agent), and destroy the old high-end equipment manufacturing enterprises (agent) in the process of simulation.

Through manually adjusting Δx_i, we can observe different simulation results, i.e., high-end equipment manufacturing enterprises with the increasingly stronger dynamic core capability, sustainably operating high-end equipment manufacturing enterprises with stable dynamic core capability, going bankrupt high-end equipment manufacturing enterprises with weak dynamic core capability, and newly born high-end equipment manufacturing enterprises after restructuring dynamic core capablity in line with market demand. The function in the simulation process is expressed in Fig.2, among which D_{j0} is the threshold value.

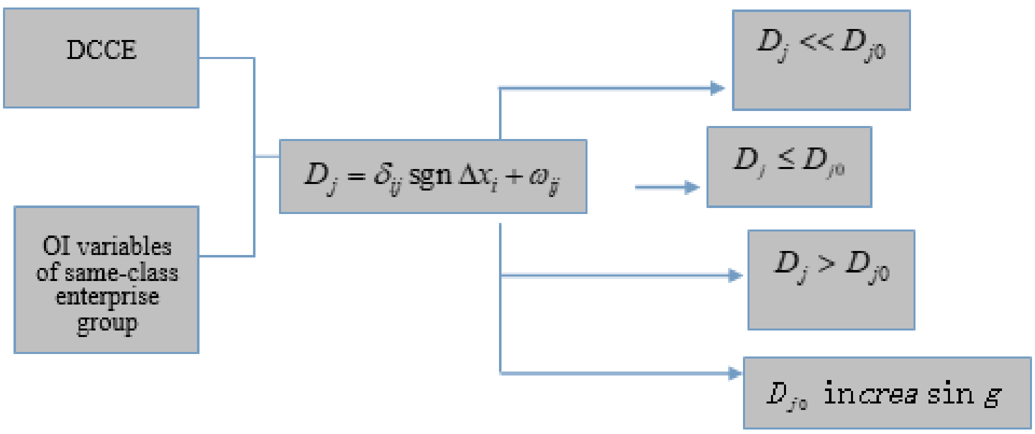

Fig 2: Function expression of Swarm simulation process

The logic diagram of Swarm simulation process is shown in Fig 3 of dynamic core capability emerging promoted by organizational innovation of high-end equipment manufacturing enterprises.

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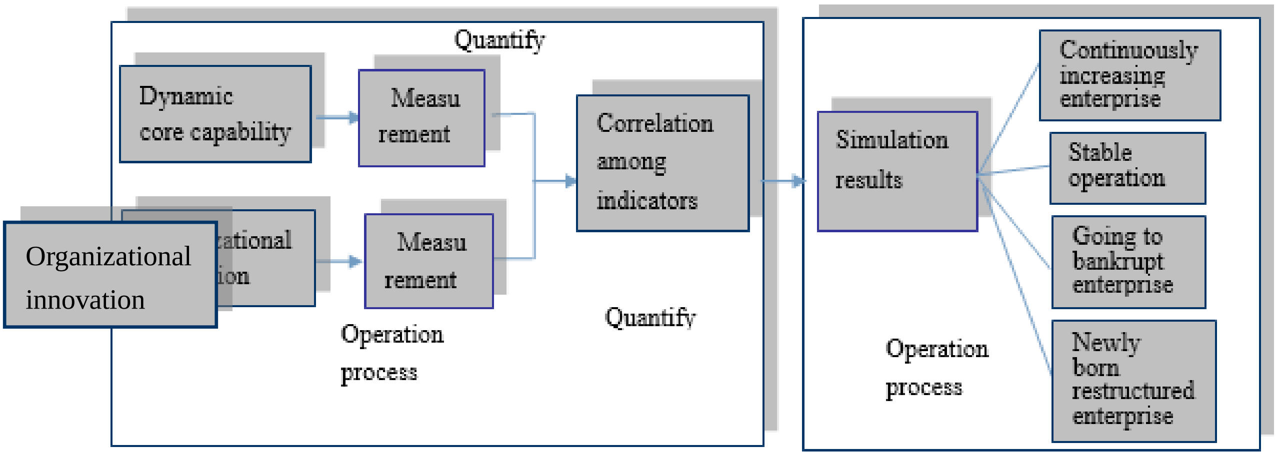

Fig 3: Logic diagram of Swarm simulation process

2.1 Input and Output Indicators of Simulation

(1) Input indicator. Input indicator refers to the variables of high-end equipment manufacturing enterprises organizational innovation driver. It is expounded carefully in the part of driving causes, and 35 indicators are selected, as shown in TABLE I in details.

TABLE I Organizational Innovation Variables Indicator of Simulation

Variable	Connotation of Variables	Variable	Connotation of Variables
*X*1	Basic level construction reform system of organizational structure	*X*2	Communication in the same level in organizational structure
*X*3	Level number of enterprise organizational structure	*X*4	Problem solving capability of staff in every department
*X*5	Communication among different levels in organizational structure	*X*6	Participating situation of staff in every department into enterprise system setting
*X*7	Responsible for their own jobs of staff in every department	*X*8	System number of enterprise lead to quality improvement
*X*9	Enterprise motivation situation to perfect innovation system	*X*10	Same goal and prospect share within all levels of enterprise
*X*11	Emphasis extent of management on learning capability	*X*12	Emphasis extent of different levels on knowledge learning
*X*13	Consistency between enterprise development goal and staff development goal	*X*14	Suggestions by staff to analyze organizational development
*X*15	Striving extent of enterprise staff for organizational goal	*X*16	Accuracy rate of staff suggestions

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*X*17	Continuous staff enquiry to know market	*X*18	Enterprise organizing staff to learn enterprise development experience
*X*19	Cost not worried by staff generated by understanding customer need changing	*X*20	Staff recognition on knowledge share
*X*21	Significance of high-level management recognition on knowledge share	*X*22	Enterprise management innovation and starting business sprit
*X*23	Position of innovation in enterprise value	*X*24	Extent of enterprise motivate innovation and tolerate failure
*X*25	Reward extent of enterprises to innovation talents	*X*26	Emphasized extent of technology staff
*X*27	Harmony among enterprise and outsides in cooperation	*X*28	Propaganda extent of enterprise to innovation talents
*X*29	Staff to innovation sprit	*X*30	Definite enterprise business borderline and position
*X*31	Extent of enterprise management paying attention to democratic decision	*X*32	Many or few technical analysis report
*X*33	Strategy capability of enterprise in short, medium, and long term	*X*34	Enterprise have or not innovation important strategy plans
*X*35	Emphasis situation of enterprise on SWOT analysis		

(2) Output indicator. Output indicator refers to the indicator to reflecting the situation of enterprise dynamic core capability. According to the DCCE composite factor analysis in Chapter 2, 17 indicators are further refined as shown in TABLE II.

TABLE II Output Indicators of Simulation

(*D*1) Your enterprise can rapidly obtain market changing information;
(*D*2) rapidly obtain internal operation information;
(*D*3) Accurately predict changing trend of the matter according to obtained information
(*D*4) Obtained resource quality higher than rivals;
(*D*5) Obtained resource cost lower than rivals;
(*D*6) Obtained resource speed faster than rivals;
(*D*7) Can obtain key resources according to environment change;
(*D*8) Can more easily sell same-kind products than rivals;
(*D*9) Can fully use of idle resources;
(*D*10) Can dispose idle resources at reasonable price;
(*D*11) Can coordinate cooperation among each internal departments according to demand of external environment change;

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(*D*12) Can coordinate internal staff according to demand of specific enterprise business;
(*D*13) Can adjust production scale to measure enterprise dynamic internal integrating capability according to market demand punctuation;
(*D*14) Can coordinate relation with suppliers according to environment change;
(*D*15) Can deal well with the relation to governmental departments according to environment change;
(*D*16) Can coordinate operation in every regional market according to environment change;
(*D*17) Can deal well with the relation to customers

2.2 Build ModelSwarm.java

Model Swarm creates 10 high-end equipment manufacturing enterprises, and defines time for every enterprise decision action. As to the decisions within every time, the changing rules of every indicator of every enterprise are also defined in the enterprise decision actions, and the mutual impacts among enterprises are shown in the Model Swarm. Model Swarm is like a stage, and enterprises perform competitive actions on it.

There are 2 important methods and other auxiliary methods.

In simulation experiment, method build Objects ( ) creates 10 enterprises according to model Enterprise, creates time series in method buildActions ( ) , and call in different specific method at every time point.
//buildObjects ( ) creates 10 enterprises.

Other auxiliary method is BH ( ), i.e. enterprise change.

In the method BH (), decisions are made according to market situation. After every enterprise has made decisions, every variable will change. And then according to 17 output indicators, relationship among variables and output indicators is established, so as to calculate value of every output indicator. The main calculation methods is: setX1,setX2,…,setX17.

2.3 Build ObserverSwarm.java

Observer Swarm probes the results of decision actions of enterprise generated within every time series, reads out the data from Model Swarm, and probes the results of decision actions of every enterprise, mainly covering the final 17 output indicators. Not only the variables, but also the methods are probed, and then changing situation of results is shown in the plots graphs.

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There are two main methods in Observer Swarm, i.e. buildObjects ( ) and buildActions ( ).

(1) buildObjects( ) builds basic graph construct the basic figures according to upstanding information accurate today predict the changing trend, (ezgraph3 = new EZGraphImpl (getZone ( ), "(X3) can accurately predict changing trend of the matter according to obtained information", "time (year) ", "graph")

ezgraph4 = new EZGraphImpl (getZone ( ),"(X4) Obtained resource quality higher than rivals ","time (year) ", "changing situation", "graph");

(2) The specific data is gotten by calling method in buildActions ( ) graph.
//(X3) can obtain information accurate today predict changing trend.
//(X4) obtains resource whose quality higher than that of its rivals.

2.4 Data Normalization and Output Indicator Calculation

Cross comparison is carried out among enterprises, every output indicator consists of different input indicators, every different input indicator has different weights, and every input indicator mutually impact on each other[6]. Finally, 17 indicators are used to reflect enterprises situation with corresponding different weights.

Cross comparison is carried out among high-end equipment manufacturing enterprises, and the weight of every enterprise is to be solved after normalization.

2.6 Simulation Code of OI to Promote DCCE Emerging

This simulation consists of 5 documents, i.e. Enterprise.java, ModelSwarm.java, Observer Swarm.java, Start.java, SwarmUtils.java [7].

The specific code will not be introduced here. Only some important codes are exampled as follows:

The first part involves in building enterprises basic contents and organizational innovation variables, making abstract every component of the enterprise, every part is denoted by one variable. Corresponding variables involve in total staff number, total management job number, total technician number, enterprise nature (state-owned, collective-owned, limited, share holding, private, joint-ventured, or foreign-funded), total annual sales (basic unit is 10,000 Yuan), total annual profits, total annual net profits, annual staff training expenditure, weight of R&D expenditure to total sales, total asset value, system allowing staff to suggest reform (have any or none), management hierarchy number among leaders and factory workers, communication among staff from different departments (frequency number per year), communication between upper-level and lower-level managers (frequency number per year), task accident number, total annual target tasks, participants person-time (many or few opportunity for staff of every department to participating to corporate system setting), innovation system number, system number leading to quality improvement, target task completed number, total staff salary, staff salary increased amount, knowledge learning frequency of different certain levels in the enterprise, suggestion number proposed by enterprise

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staff strive to realize the organizational goal, suggestion number proposed by enterprise staff who perceive continuous questioning as contribution to market consciousness, accuracy rate of suggestions by staff, cost that staff needn't worry about and generated in understanding changing customer demand, high-level management knowledge learning times, team group knowledge learning times (the variables above shown in the first level and the final level in knowledge learning times), innovation institution number, enterprise institution number, staff conflicts times per year, total annual profit increased amount, innovation and failure-acceptable times, failure-acceptable times in one innovation process, total innovation times, technology cooperation institution number outside of enterprise, total technician staff salary, propaganda times of enterprise to innovational excellent talent deeds, person-times of talents participating in innovation, enterprises have definite business borderline, planning number of enterprise for medium, long, and short term, technical analysis report number, time per year of enterprise to carry out SWOT analysis, have any or none of important innovation strategy planning.

The second part: enterprise dynamic core capability involves in variables of total innovation number of enterprise independent innovation (RD) including independent and introduced innovations, enterprise leading products updating cycle, enterprise product independent innovation, enterprise independent R&D success number, new technology successfully absorption and utilization number, know-how and pattern number, R&D staff in resource input(RI), resources inputted in independent innovation, introduced innovation activities (time per year), as to the manufacturing part, responding speed of enterprise facing customer demand, product qualified rate, product reliable degree, production line updating time, production line updating cost; as to marketing part, market share, customer satisfaction degree, channel-expanded success ratio, new technology successfully absorbed and utilized number of enterprise, average salary of R&D staff, average salary of staff, total profits, and salary increased etc.

2.7 Running Results

After the program processing, firstly appears control panel as shown in Fig 4 to carry out a time action, click "Quit" and then terminate simulation.

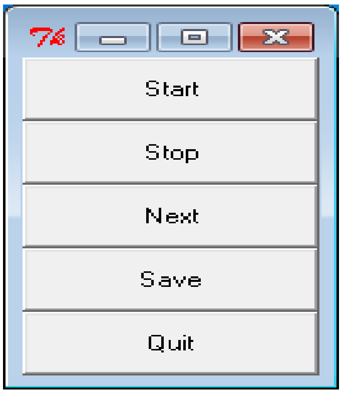

Fig 4: Control panel

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As follows are the examples of simulation results to each out of 17 output indicator. As to every enterprise situation, the "final results" are shown in following Fig 5-9.

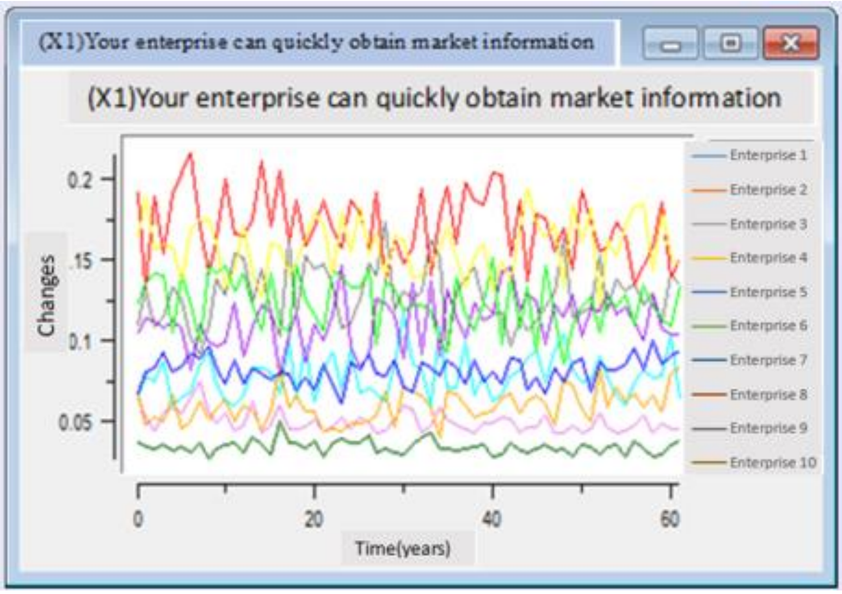

Fig 5: Output indicators X1

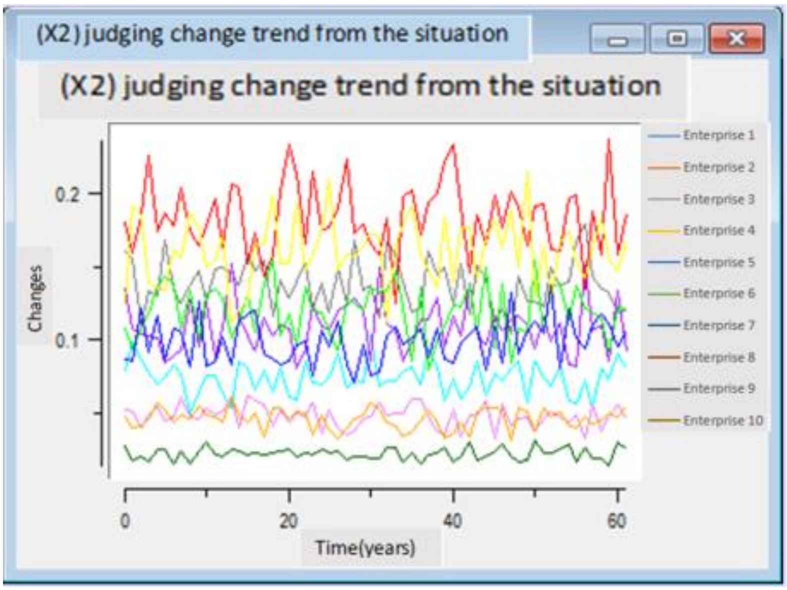

Fig 6: Output indicators X2

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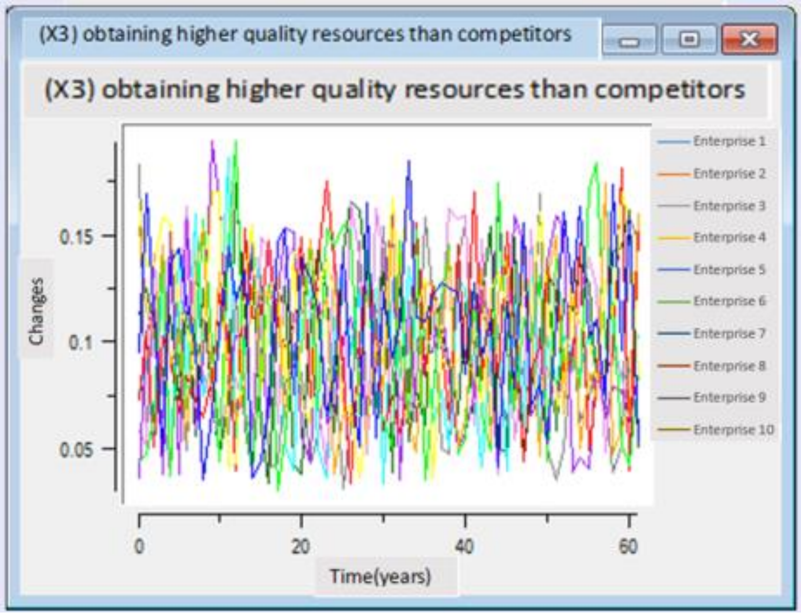

Fig 7: Output indicators X3

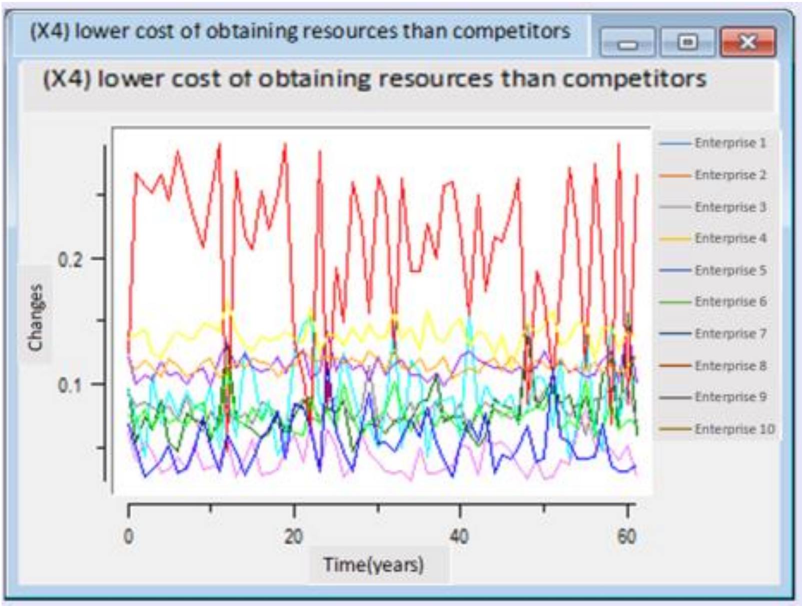

Fig 8: Output indicators X4

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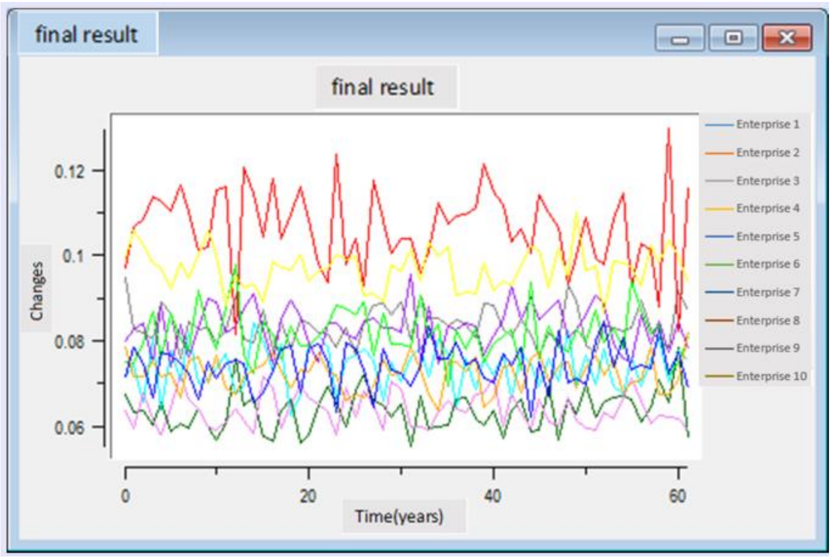

Fig 9: Figure of business simulation status

As known through Simulation, Model Swarm creates 10 enterprises, and defines time limits for every enterprise decision action. As to the decisions within every time, the changing rules of every indicator of every enterprise are also defined in the enterprise decision actions, and the mutual impacts among enterprises are shown in the Model Swarm. Model Swarm is like a stage, and enterprises perform competitive actions on it. Many enterprises are created in the method of buildObjects () of Model Swarm, as well as the decision actions of every enterprise within the same time.

In the experiment simulation, and according to the required items of output results (17 in total), every indicator for the enterprise is quantified. And output indicator value is determined according to the weight of every indicator to the output indicator.

Observer Swarm probes the results of decision actions of enterprise generated within every time series, reads out the data from Model Swarm, and probes the results of decision actions of every enterprise, mainly covering the final 17 output indicators. Not only the variables, but also the methods are probed, and then changing situation of results is shown in the plots graphs.

To shorten simulation time and show the results clearly, we select Δx_i as constant, and $D_{j_0} = \infty$ .OI action DCCE simulation is carried out to 10 enterprises. Fig.5 to Fig.8 show the results observed to individual DCCE indicator through Observe Swarm, the self-adapting emerging under the competitive condition is observed, and the complexity of function parameters δ_{ij} and ω_{ij} of OI to DCCE is explored. The final result graph of Fig. 9 is the overall results of OI function to DCCE through observing of Observer Swarm, and the emerging phenomenon in the 57th -60th year is very obvious.

It is needed to state: firstly, as simulation input indicators, i.e. variables X1-X35 describing enterprise innovation are gotten from streamlining and quantifying DCCEEMS descriptive variables X1-X42,

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directly using above-discussed analyzed results and conclusions; secondly, as the simulation output indicator, i.e. indicators D1-D17 reflecting enterprise dynamic core capability are the specific quantified indicators of opportunity identify capability, adapting capability, judgment capability, coordination capability, restructuring resources and social capital capability, integrating social network relationship capability, knowledge acquisition capability, knowledge absorption capability, knowledge transition capability, knowledge using capability, R&D capability, product innovation capability, and process innovation capability; thirdly, different from above discussion, this simulation shows objectively the community feature, i.e. competitiveness of related high-end equipment manufacturing enterprises by competition among 10 enterprises (may be many), which fully and objectively shows the self-adapting existing in competition among enterprises.

III. ORGANIZATIONAL STRATEGIES TO PROMOTE ENTERPRISE DYNAMIC CORE CAPABILITY EMERGING

3.1 Selecting Reasonable Enterprise Independent Innovation Mode

The most crucial capability factor of dynamic core capability of high-end equipment manufacturing enterprises is the fruitful independent innovation capability. If a enterprise wants to form dynamic core capability, must choose the independent innovation mode matching to its developing level [8]. Generally speaking, independent innovation capability improvement of high-end equipment manufacturing enterprises comes from external acquisition and merging and internal development [9]. To improve enterprise complimentary capability of core technology and the management through external acquisition and merging is the effective pathway for high-end equipment manufacturing enterprises to form dynamic core capability, which will not be discussed herein again. The focus herein is on selection issue of enterprises for reasonable internal independent innovation capability mode. Enterprise internal independent innovation mode selection includes original innovation, integrated innovation, and introduced innovation. But when enterprise selects the independent innovation mode discussed above, it’s not simply random selection process without principles, but rather determine to select which innovation mode is most effective to enterprise according to enterprise self resource state and development trend.

When high-end equipment manufacturing enterprises have the leading position in their business, with powerful R&D capability, or even independently master some new technologies at the present time, and enterprises want to build up their dynamic core capability, original innovation model is the first choice to the enterprises [10]. However, when high-end equipment manufacturing enterprises have not strong R&D strength, but with a relatively strong independent innovation dynamic need, in this time, integrated innovation is the main pathway for enterprises to develop dynamic core capability. But in the process for high-end equipment manufacturing enterprises select integrated innovation mode, they must actively carry out the technology capability improving steps of technology R&D, engineering design, and process development, so as to become truly technological cooperation agent. This point is especially important to Chinese enterprises. In independent innovation cooperation process, most of the high-end equipment manufacturing enterprises have acted as the role of capital investors in technology and a process

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development, rather than technology master. This leads to enterprises lose negotiation strength in the key time due to technology subject to control of others, which peripherizes them in the independent innovation capability improvement process.

In reality, many Chinese high-end equipment manufacturing enterprises choose the introduced innovation mode so as to improve enterprise core technology capability [11]. Some enterprises perceive core technology as core capability. As long as continuously introducing new technology, enterprise can continuously update capability so as to form sustainable competitive advantage. Impacted by such misunderstanding some high-end equipment manufacturing enterprises are keen on purchasing matured technology while ignoring the self absorption-assimilation and develop capability improvement. But the condition to develop enterprise dynamic core capability by purchasing matured technology is the party of technology transfer is not subject to any restriction, which is a perfect market behavior. Furthermore, introduced technology needs for matching with enterprise internal resources. However in reality, this is obviously impossible because technology introduction or purchasing of Chinese high-end equipment manufacturing enterprises is subject to many factors in politic, economic, and culture aspects. The existence of those factors cannot ensure that high-end equipment manufacturing enterprises can always maintain in line with the world with the mostly new technology. If they can not maintain to holding the latest technology, they will always passively fall into playing the second-class role in competition and for long time enterprises will go into troubles. In addition, invariable introducing or purchasing technology will make enterprises to form dependence on this mode so as to make enterprises falling into some core robust. Maybe in the beginning the introduced technology brings fruitful profits to the high-end equipment manufacturing enterprises, but because the technology barrier is week, repeated introduction of rivals will soon damage and diminish the core capability of enterprises newly formed, and the two or multiple parties in competition will continuously fall into the price wars. In previous years the non-efficient competition status of Chinese color TV set market is because color TV set enterprises competed for introducing technology rather than emphasizing on independent innovation capability or developing featured products.

3.2 Innovation Leading Strategy of Entrepreneurship

In 1990, an epoch-making article by C. K. Prahalad and Garry Hamel is published in Harvard Business Review, i.e. Enterprise Core Capability. However in the present dynamic competitive environment, enterprises are hardly to make present competition advantages extended. The only feasible way is to try to obtain the sustainable competitive advantages, and the essence is the dynamic enterprise competitive advantages, while dynamic competitive advantages come from dynamic core capability. Only if high-end equipment manufacturing enterprises adapt to environment change through dynamic capability, can they form the long-term sustainable development capability. The development process of big enterprises in the world shows that enterprise dynamic core capability is the key factor to lead enterprises to success. To build high-end equipment manufacturing enterprises dynamic core capability needs for all resources, but one of them can not be purchased in the market, which is the entrepreneurship existing with the founders. The famous management master Peter F. Drucker argues that entrepreneurs are the persons granting resources with wealth productive capability. In other words, there exist entrepreneurs to make high-end

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equipment manufacturing enterprises possible to produce and create wealth. Domestic and overseas researchers have proved that entrepreneurship is the key source for enterprises to obtain the sustainable development capability.

Therefore, we suggest that when high-end equipment manufacturing enterprises pay more attention to dynamic core capability development, more focus is given on exerting entrepreneurship, and high emphasis is paid on the leading function of entrepreneurship in innovation activity, actively make use of positive impact of entrepreneurship on enterprise dynamic core capability, so as to make them better to cooperate and promote emerging and improvement of enterprise dynamic core capability.

IV. CONCLUSION

This dissertation uses swarm platform to simulate the process of organizational innovation promoting the emergence of enterprise dynamic core competence, and puts forward two organizational strategies to promote the emergence of enterprise dynamic core competence, that is, choosing a reasonable enterprise independent innovation mode and the innovation strategy dominated by entrepreneurship.

Based on complex adaptive system theory and organization management theory, with the help of advanced statistical methods, this dissertation makes some innovative research on the formation of enterprise dynamic core competence, and obtains some valuable results. However, due to the complexity of the emergence of enterprise dynamic core competence and the limited ability of the author, there are still problems to be further studied. Firstly, it was limited to the sample size of the current research, the researcher only made a written analysis of the emergence of the dynamic core competence of enterprises at the individual level and team level, and failed to be used for the subsequent swarm simulation. In the follow-up simulation part, the research only starts from the organizational innovation elements at the organizational level, and obtains the changes of organizational innovation and enterprise dynamic core competence at different times, as well as the comparison between different enterprises. Secondly, aiming at the application of management practice, the next direction of the researcher is how to cultivate enterprises that have emerged dynamic core competence.

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