A STUDY ON IMPROVING OF INCUBATING-EFFICIENCY OF INCUBATORS IN ZHEJIANG PROVINCE, CHINA

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**A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
Doctor of Philosophy (Management)
International College,
National Institute of Development Administration
2018**

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ABSTRACT

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As the business infrastructure of modern society, the incubator plays a decisive role in promoting regional economic development, alleviating regional employment pressure and improving regional innovation capacity, and is also an important policy tool designed by the government for promoting economic development. Since its birth, countries around the world have been widely adopted and put into practice and have made great progress. However, with the deepening of entrepreneurial activities, the increasing cost of resources, the increasing pressure of industrial upgrading and talent acquisition, the operation and management of the incubator is facing unprecedented pressure. Especially in China, with the deepening of reform and development, industrial upgrading is indispensable, which brings about unprecedented challenges to support new enterprises. As the starting point of entrepreneurship, incubator is an important power source in the development of new enterprises（NE）. Facing the new business pattern, the incubator needs to step out of the traditional operation mode, pay attention to the efficiency of resource allocation while considering fairness, and truly give play to its role as the engine of regional economic development. Therefore, how to build a more reasonable incubation system in a specific environment, maintain pareto efficiency in the process of dynamic allocation of resources, effectively improve the incubation level of the entire region, and optimize the incubation efficiency of the existing incubator is one of the major issues faced by the theoretical research and practical work of the incubator.

Around the improving of incubating-efficiency, scholars have conducted a lot of research. However, it can be seen from the existing research results that relevant theoretical research is still in its infancy, with relatively few independent studies, and no independent incubator theoretical framework has been developed. As for the research on the incubating-efficiency, this paper starts from the perspectives of entrepreneurship

activities, NE characteristics, and incubator operation. In combination with China's national conditions, it uses the enterprise life cycle theory, pareto optimality theory, synergy theory and x efficiency theory for reference, and analyzes the operation of the incubator and the influencing factors. At the same time, to avoid the confusion of specific concepts in the study, this paper also redefines the concepts and classifications related to the incubator and gives a new interpretation of its connotation. This also provides an adaptive and general definition for future incubator research.

This paper discusses how to integrate incubation resources from the perspectives of entrepreneurship activities, NE needs and incubator services to reduce waste and improving the existing incubating-efficiency. Main research contents include factors affecting entrepreneurial activity, regional entrepreneurial environment, analysis of incubation factors of NE, comparison of incubating-efficiency of incubators in the same region, and improvement strategy of incubating-efficiency. The research area of geography is Zhejiang province of China; The innovation of the research lies in the construction of a new hierarchy incubation system model. In terms of research methods, this paper makes a comprehensive analysis of the problems existing in the current incubator operation by combining qualitative and quantitative methods and finds out the direction of efficiency improvement. To be specific, the efficiency value of each indicator is measured through DEA method for the sample of incubator in Zhejiang province, and the results of efficiency measurement are analyzed. Then, the in-depth interviews with relevant personnel of the incubator are conducted and tested and confirmed the efficiency value of each factor and DEA analysis results in the interview. In the applicability selection of DEA Model, on the premise of adopting the non-oriented DEA Model (input-prioritized), the Hybrid Distance function is introduced in this paper, which makes the improvement of invalid DMU more sufficient. The data measured by the DEA mainly comes from the 2017 China Torch Statistical Yearbook.

It is pointed out in this paper that accurate business development assessment and targeted entrepreneurship counseling are provided before NE enter the incubation process of incubator, which will help improve the incubating-efficiency of the incubator. Focusing on the process management of cultivation, continuously and dynamically evaluating the growth of NE throughout the cultivation process is conducive to the improvement of the

incubating-efficiency of the incubator. Strengthening the construction of science and technology and talent resources will help to improve the incubating-efficiency of the incubator. The stability of the small environment inside the incubator (including the staff of the incubator and the staff of NE, finance, management policies, industrial direction, etc.) and the industrial category and quantity of NE have a positive impact on the incubating-efficiency. The NE does not focus on the property rights of the incubator, but only on whether it can obtain sustainable and stable development resources from the incubator. The business income of NE cannot reflect the incubating-efficiency of the incubator. For NE, they should pay more attention to the innovation of their business model and the stability of the team, rather than financial indicators. The professional construction of incubators (such as the cultivation of industries, the concentration of access to resources, the quality and quantity of entrepreneurship tutors, the industry category and development stage of selecting NE, etc.) and the layered services for the cultivation of NE have a positive impact on the incubating-efficiency. The public incubation platform and professional incubator model can help form regional incubation network, make the incubation resources more concentrated, accelerate the flow of information and talents, reduce the management cost, and improve the incubating-efficiency of a region. The stability of a region's entrepreneurship policy and the number of professional PE and VC will affect the incubating-efficiency of an incubator. In addition, the sharing and networking construction of incubation resources can improve the incubating-efficiency. The introduction of market competition mechanism is the precondition for the improving of incubator efficiency. The core incubation services that will have an impact on the performance of NE include the comprehensive quality improvement of entrepreneurs; Ability to assist in developing enterprise strategy; Periodical hatching resource supply and matching ability; Industrial cluster and market network construction ability; Degree education resource supply ability; Ability to design business models.

In this paper, some important conclusions are obtained on the research of improving incubating-efficiency. It provides an idea for the construction of a new incubation model, provides an optimization strategy for the improvement of incubating-efficiency, and provides policy Suggestions for the construction of incubators.

ACKNOWLEDGEMENTS

At the point of finishing this dissertation, I would like to express my sincere thanks and appreciation to all those who have lent me hands in the course of my writing this paper. First of all, I would like to take this opportunity to show my sincere gratitude to my advisor, Dr. Renliang Li, who has given me so much useful advices on my writing, and has tried his best to improve my paper. His professional judgments and advices have contributed immensely to the completion of the study. Secondly, I would like to express my gratitude to committee members: Professor Dr. Zuojun Wang, Southwest University China, Associate Professor Dr. Lijuan Shen，Southwest University China, for kindly reviewing and giving valuable comments throughout my study. In addition, I would like to thanks all Professors, who offered me references and information on time. They encouragement and professional advices have contributed significantly to the completion of the study. Last but not the least, I would like to thank my family especially my wife and my son, who gave me the strongest moral and material support during my Ph.D. And sincere thanks them for their encouragement, love, and warmed. Without their support, it would be much harder for me to finish my study and this dissertation and can't get the Ph.D. Therefore, this glory should also belong to them.

Zhenfeng Ge

December 2018

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CHAPTER 1
INTRODUCTION

1.1   Research background and significance

Historically, we can be found that entrepreneurs are active behind economic prosperity, and the hero behind entrepreneurs who can display their talents and support the rapid growth of new companies is a variety of business incubators. Currently, the global quality of incubators are mostly concentrated in the United States, ten of the most well-known incubator are as follow: The Technology Innovation Center(TIC),Palo Alto Research Center(PARC, Founded in 1970),The Advanced Technology Development Center(ATDC at GIT, Founded in 1980),MGE Innovation Center(Founded in 1984),Massachusetts Biomedical Initiatives(MBI, Founded in 1985),The Environmental Business Cluster(Founded in 1994),Houston Technology Center(HTC, Founded in 1999),The Research Park(At UIUC, Founded in 1999),The Icehouse(Founded in 2001),Y Combinator(YC, Founded in 2005).These well-known incubators not only set an example in the cultivation of new enterprises, but also play a benchmarking role in promoting the development of incubator industry; more importantly, they can effectively organize market resources, guide entrepreneurs to grasp new business opportunities, and have become an important driving force for a region or country to take the lead in this era.

1.1.1   Research background

Business Incubators are affiliated industries that emerged for entrepreneurial activities. Due to its promotion of the concept of entrepreneurship and the strong support of the growth of new businesses, the Business incubator has become a platform for public policy tools and commercial resources. It has the necessity of independent existence, development and research, and has generated broad market demand.

It is from the historical origins of business incubators and entrepreneurship. As early as in the late Middle Ages in Europe, the word "Entreprendre" appeared in French. At that time, a time when European feudal society, the development of entrepreneurial activity has been greatly suppressed. Until the 14th century, the emergence of capitalism in Europe, along with the prosperity of commodity trade, the role of

entrepreneurs in promoting the development of social productivity is increasingly apparent. In 1912, Joseph Alois Schumpeter proposed "innovation" and its role in economic development in the book "Economic Development Theory" and proposed that entrepreneurs are the concept of creative vandals and the direct promoter of innovation. With the development of economic management theory and the strengthening of free trade and economic globalization, it has greatly boosted the upsurge of entrepreneurial activities. At the same time, however, the cost of acquiring entrepreneurial resources is getting higher and higher. Entrepreneurs need a basic service organization that can obtain more concentrated business resources to help them, accelerate the cultivation of new enterprises, and resist the risks brought by operations. It is because of this huge market and social needs that the incubator was born, and from the moment of its birth, it shouldered the heavy responsibility of social business infrastructure and resource allocation.

It is particularly noteworthy that the modern concept of incubator originated from poultry hatching in farms and was introduced to the commercial community by Joseph Mancuso, who is an American. In 1959, in Batavia, New York, Joseph Mancuso used the idle office building left behind by Massey Ferguson's bankruptcy to establish the world's first business incubator - the Batavia Industrial Center (An The area of about 850,000ft^2), which subsequently created tens of thousands of jobs in the region. Therefore, Joseph Mancuso is also known as the father of modern incubators.

With the global economy has entered a period of rapid development, accompanied by a sharp increase in demand for new business cultivate, the business incubator industry has entered a golden period. European incubator first appeared in Britain in the 1960s, followed by the introduction of Australia and Asia in the 1970s; the late 1980s, under the impetus of the United Nations Science and Technology Development Fund, the incubator came to China, and has been widespread concern in the government. To make the business incubator better adapt to the characteristics of China's economy, rapidly improve enterprise innovation ability and technology transfer capacity, the Chinese government made the incubator construction to be an important part of the "Torch plan", that formulated by Ministry of Science and Technology of the People's Republic of China in the late 1980s.In 1987, Wuhan east lake new technology startup service center, the first business incubator in China, was established. At this

point, China kicked off the comprehensive construction of the business incubator. Since May 2013, China's ministries and commissions have issued relevant documents to promote the development of entrepreneurship and innovation and support policies for the construction of incubators. By 2017, the number of all kinds of incubation platform in total 7533 (mainly type includes: the integrated business incubator, technology business incubator, professional technical and product incubator, talent incubator, comprehensive international incubator, virtual incubator, university of science and technology park, etc.), is already the world's first, and the commercial operation of the incubator accounted for nearly one third (As shown in Figure 1.1 1).

To better adapt to the development needs of China's entrepreneurial activities in the next stage, China's existing incubators will face the pressure of improving incubating-efficiency and adjusting the organizational structure, and the elimination and merger are inevitable. According to consultancy report from Zero2IPO[1]，China's incubator development showed an inflection point in 2015, withstand 10 years of fast development from 2006 to 2015, the number of incubators declined for the first time. Moreover，the business model iteration of the incubator began to accelerate, and more and more attention was paid to the incubating-efficiency, whose main contents included resource integration ability, network coordination ability and new business cultivation efficiency in the vertical professional field.

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[1] Zero2IPO：It is a pioneer in China's entrepreneurship and investment industry and positioned as China's leading entrepreneurial and investment service platform and investment firm.

Figure 1.1 1 2006-2017China Business Incubator Quantity Change Chart
Source: Zero2IPO 2018 Entrepreneurship Report

With reference to the United States and Israel, where the incubators are more mature, the services of the incubators are complex. In terms of property rights, the incubators have been privatized，and the business model of the incubator suitable for the development of industries has been explored. As a late-developing country of incubator construction, China has always been highly enthusiastic about its investment and construction. In 2014 there was an explosive development with an annual growth rate of nearly 50%．Rapid development also leads to uneven quality, with excessive emphasis on quantity while ignoring quality. In addition, from the perspective of the development maturity of China's incubator, according to Huang Ziwei's research in 2015, it can be mainly divided into three stages, as shown in Table (1) 1.1.1(Ziwei Huang & Wei Liu, 2015).Its main features are as follows: stage I, business incubator 1.0（B.I.1.0）, which is mainly featured by government funding subsidy, and the incubator leasing its own or government-commissioned office space, that is, being a sublessor to earn profits; Stage II, business incubator 2.0（B.I.2.0）, added basic incubation services besides providing venues, such as financial support, labor resources, entrepreneurial consulting, etc. Stage III, business incubator 3.0（B.I.3.0）, adopts the mode of "real estate + deep service", where the deep service is mainly supported by VC. At present, most incubators in China belong to B.I.1.0 and B.I.2.0, which is a fully competitive industry. How to get a foothold in the competitive market

depends on the utilization efficiency of incubation factors and innovation ability in business model.

Table 1.1 1 Key Difference between Incubator 1.0 to 3.0

	B.I.1.0	B.I.2.0	B.I.3.0	COMMON
Entrepreneurs Selection	Easing	Easing	Strictness	
The service relationship	Sublessor	Business consultant	Partner	
B.I. Contributions	Promoting employment	Improve the success rate in entrepreneurship	To accelerate N.E. development	Emphasis on the construction of entrepreneurial resources and incubator hardware.
Hardware facilities	Heavy assets	Heavy assets	Light assets	
Income	Rent	Rent+Service fee+Subsidy	Value-added Services+Return on investment	
Balance of account	Non-profit	Meager profit	Sustained high profits	Ignore the operational efficiency of the incubator.
Founders & managers	Government	Public agent+ Real estate agent	Multi-party investors	
Core competitiveness	Rent and Subsidy	Preferential policies	Coordination and matching of supply and demand relationship of entrepreneurial resources	

Moreover, the research on incubator lags far behind the research on entrepreneurial behavior. Sean & David pointed out as early as 2004 that the basic research of incubator is still in five aspects of "Studies centering on incubator development, incubator configurations, incubatee development, incubator-incubation impacts, and theorizing about incubators-incubation", and it's slow going(Hackett & Dilts, 2004a). With the rapid development of the incubator construction driven by the

entrepreneurial activity boom, more and more people begin to pay attention to the research in the incubator field, and gradually approach other research fields of entrepreneurship in terms of the number. This study is based on the methods and results of Zhu Jinwei and Zou Ling (Jinwei Zhu & Ling Zou, 2016)，Database resources, including Google Scholar and Baidu Scholar, were used to re-search high-frequency words related to the incubator study and update the data. The results were shown in Table 1.1 2 and Figure 1.1 2.

Table 1.1 2 The High-frequency Words of Incubator Research

S.N	HFW(CHN)	F1	HFW(CHN,Abbri.)	F2
1	INNOVATION	1090	Management （MAN）	14000
2	ENTREPRENEURSHIP	451	National Parks （NAP）	11400
3	ECOMOMIC DEVELOPMENT	341	Nature （NAT）	7020
4	SCIENCE PARK OF COLLEGE	322	Environment （ENV）	6930
5	HIGH-TECH INDUSTRY	234	Evaluation （EVA）	6460
6	TECHNOLOGY INNOVATION	191	Innovation （INN）	3140
7	ECO-INDUSTRIAL PARK	140	China （CHN）	2750
8	S & T ACHIEVEMENTS	139	New Technology-based Firms （NTB）	1750
9	DEVELOPMENT MODEL	130	Parks （PAR）	1640
10	DEVELOPMENT STRATEGY	101	Sustainable Development （SUD）	1540

The top 10 words of the high frequency words related with incubation research as above list.
Search in the title:incubator or science park or industry park or entrepreneur park；
Search time on 18th June 2017； **Material Type**: Articles； **Search Publication Date**: ALL
CSSCI: 3070； SSCI: 31500；
S.N.:Serial Number； **HFW**:High Frequency Word； **F1**:Frequency(CHN)； **F2**:Frequency(Non-CHN)；

Source: Google Scholar and Baidu Scholar

It is not difficult to find from the results of the re-search and statistics that the research on Chinese incubator has been paid much attention by all parties, and it is the only country in the top ten of the research hotspots, which has become a hot spot of global incubator practice and research. From 2000 to 2016, the average ratio of incubation research to all entrepreneurship research remained stable at around 46%，as shown in table Figure 1.1 2. On the other hand, in terms of the distribution of research hotspots, it basically conforms to the research conclusion of Zhu Jinwei and Zou Ling, that is, there are not many researches on the incubating-efficiency of the incubator.
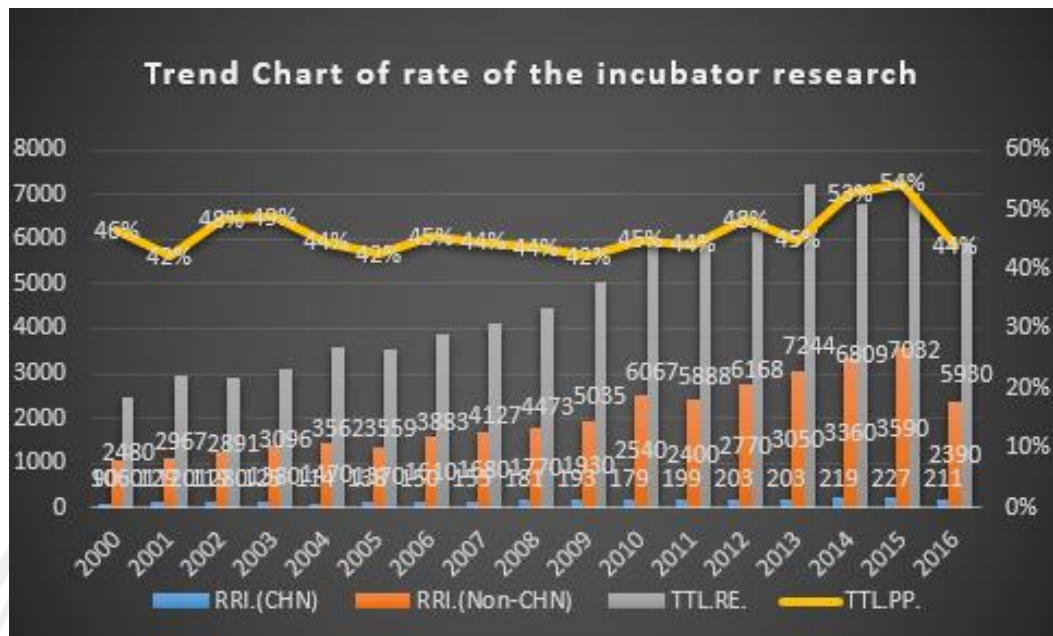
Figure 1.1 2 Trend Chart of rate of the incubator research
Source: Google Scholar and Baidu Scholar

Sean & David pointed out that in the five directions of basic research on incubation, should pay attention to the incubating-efficiency and have a better understanding of "How and why the incubation process leads to specific incubation outcomes". Based on the above background of incubator development and research, this research focuses on the analysis and improvement of incubator efficiency.

1.1.2　Research Significance

This study is of great theoretical significance in clarifying the core incubation elements and redefining the concept and classification of incubators. It provides a new thinking direction and theoretical basis for improving incubating-efficiency and making the incubator development plan for the government.

1.1.2.1　Theoretical Significance

From 2000 to 2016, there has been a continuous increase in the interest of incubation efficiency in the incubator field. Therefore, the research on incubation efficiency is in line with the trend of development of incubator research, and its theoretical significance is as follows：

1. At present, in the field of incubator research, the research on the improvement of incubating-efficiency still lacks systematic theoretical support and

optimization path. From the perspective of incubator operation and management, this study will analyze the internal and external environment of the incubator and measure the efficiency of the incubator. Then，the concept of incubation network is introduced to further enrich the theoretical research on incubating-efficiency and provide a new research perspective for the construction of new incubation model.

2. Based on literature research, the development of incubator is analyzed in this paper. Combined with the Chinese situation, the development and evolution stages of the incubator were redevised into generations, and the theory was expounded. It provides a theoretical basis for the development of the next generation of Chinese incubator.

3. After nearly 30 years of development, the Chinese incubator has become an important part of national and regional technological innovation and new enterprise cultivation systems. The development of a new generation of incubators has become an important strategic tool for national development. This study provides a new theoretical direction for the development of the next generation of incubators.

Therefore, this study is a supplement and improvement of the research theory of incubation efficiency of incubators.

1.1.2.2 Practical Significance

Since entering the 21st century, the hot rush of starting business around the world, the number and speed of new business go beyond any period of history. In this round of entrepreneurial growth, incubators create a significant number of new jobs. According to the OECD member states in the 2012-2017 social employment survey, each member of the new enterprise (employee number less than 9 people) showed considerable achievements, top three, respectively is South Korea, the United States, Turkey, such as Figure 1.1 3 (OECD, 2017). The incubation of the incubator as a service provider to integrate social resources, to channel entrepreneurship, to promote innovation, to incubate a new business, is the most concentrated service platform for entrepreneurial resources, and a core infrastructure of regional or national innovation and new enterprise incubation.
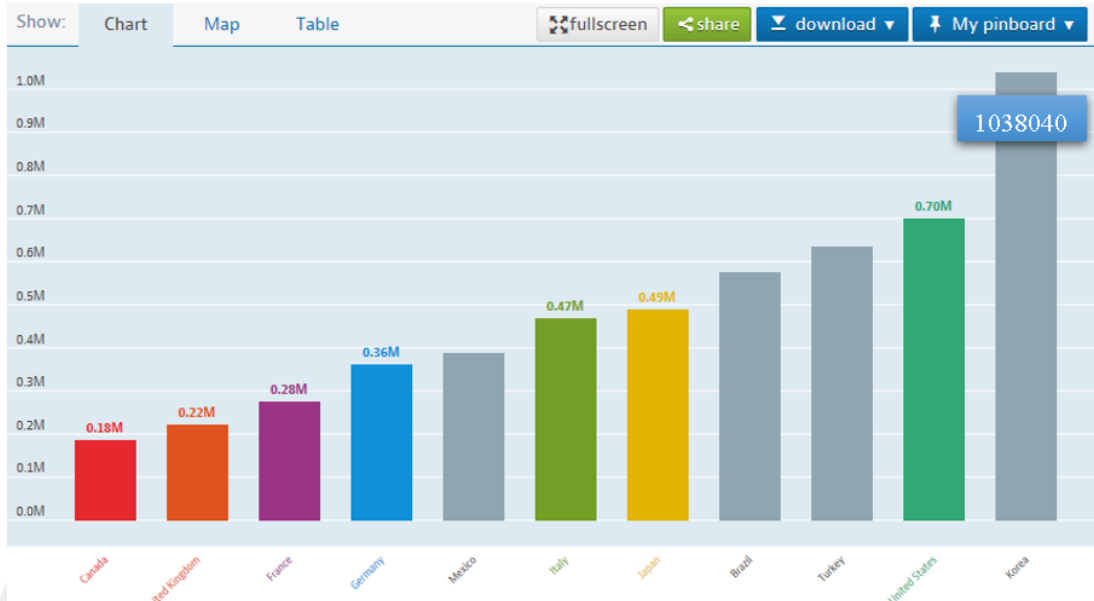
Figure 1.1 3 The employees of new emprises of OECD members
Source: OECD 2017 EMPLOYEES REPORT

In 2017, new companies in OECD member countries accounted for the largest proportion of employed people in Greece, accounting for about 7% of the total employed population, as shown in Figure 1.1 4.
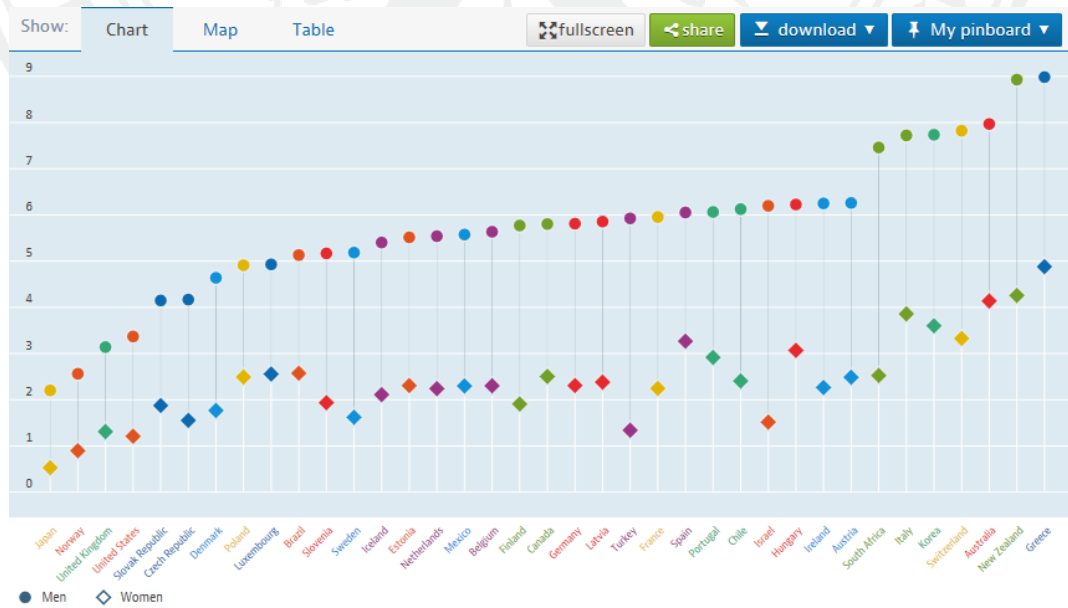
Figure 1.1 4 Proportion of NE employment in OECD member states
Source: OECD 2017 EMPLOYEES REPORT

Generally, NE is classified into SEMs, and often need to face numerous crises and risks in the development process. Research shows that the failure rate of a startup is 40% in its first year and 90% in its tenth year(Z. H. Guo et al., 2007).European start-ups, on average one-third will be in the second year of its existence failed, and within seven years will also have more than half of business failures (Aerts, Matthyssens, & Vandenbempt, 2007).NE face the same situation in China, where the failure rate of entrepreneurs is as high as 90 percent (Pena, 2004).In order to improve the success rate of entrepreneurship, integrate resources, and reduce the risk of new business operations, the incubator has taken on the umbrella of NE. As an important policy tool to enhance regional innovation capability and economic vitality, incubators are promoted, supported and constructed by many national and regional governments(Pena, 2004).

Regardless of economic development or employment protection, promoting the rapid growth of new businesses in the region requires the region to have enough incubation capacity. Or, a basic cultivation platform consisting of a quality incubator is needed. In addition, measuring the incubation capacity of a region depends not only on the number of incubators in the area, but more importantly on the quality of incubation, i.e. the incubating-efficiency. As pointed out by Sean and David:(Hackett & Dilts, 2004b)：Focusing on the nature of incubation process management and NE development results is to focus on the efficiency of incubation. Therefore, the in-depth study of incubation efficiency has objective practical significance. At the same time, there is a strong market demand for exploring a new generation of incubators and efficient use of incubation factors.

1.1.3 Innovation point in this thesis

The innovations of this research are mainly as follows:

1) By analyzing the resource elements, the effective incubation mode of the incubator is constructed.

At present, much research focuses on the overall cultivation efficiency of the incubator. There is a lack of analysis on the classification of the incubator according to the development stage and the matching of incubation resources, and the research on the business process of the incubator is vague. Based on the analysis of resource matching in different development cycles of NE, this study constructed a hierarchical

incubation model, which can effectively optimize the incubation efficiency of existing incubators.

2)   The new concept of incubation system was redefined.

The concept of new incubation system is based on the hierarchical model of incubation network, which can promote the sharing of incubating resources and improve the utilization rate of resources in the whole region.

1.2   Research scope

This study focuses on the incubating-efficiency of the incubator, and the main points are as follows：

1.   Proposal range

The proposal including that the influencing factors of entrepreneurial activity, regional entrepreneurial environment and incubation analysis of NE, comparison of incubating-efficiency in the same region, and incubating-efficiency improvement strategies;

2.   Research area

The sample is from Zhejiang region of china.

3.   The period of investigation and Date collection

From 2015 to 2017；

1.3   Research objective

Based on the analysis of entrepreneurial elements and incubation mechanism, the efficiency of incubators in each incubation dimension is measured, and a new model of layered incubation system is constructed. On this basis, the improvement strategy of incubating-efficiency is put forward.

CHAPTER 2
LITERATURE REVIEW

This chapter contains the theoretical basis, concept definition and literature research. The main contents are as follows:

2.1 Relevant theory to the efficiency research；

2.2 The theory of synergetic；

2.3 Enterprise life cycle theory；

2.4 Relating-concepts re-define in the research；

2.5 Review of Incubation & incubation-efficiency；

2.6 Overview of Incubators & Incubation in Zhejiang, China；

2.1   The theory of Synergetic

Synergetic is founded by Hermann Haken who is famous physicist at Universität Stuttgart in Germany. It is an interdisciplinary theory used to explain the formation and self-organization of patterns and structures in open systems far from thermodynamic equilibrium(Haken, 1978). Synergetic theory mainly includes three aspects: synergetic effect, servo principle and self-organization principle. Synergistic effect refers to the result produced by synergistic effect and refers to the overall effect or collective effect produced by the interaction of many subsystems in a complex open system. For natural system or social system, there are synergistic effects, which are the driving force for the formation of systematic orderly structure. In any complex system, when the external energy or the aggregation state of matter reaches some critical value, there will be synergistic effect between the subsystems. This synergy can cause the system to produce a synergistic effect at the critical point, causing the system to change from disorder to order, and to generate a stable structure from chaos. Synergistic effects reflect the self-organization of the system. Servo principle, that is, fast variables obey slow variables, and order parameters dominate the subsystem behavior. It describes the process of self-organization of the system from the interaction between internal stability factors and unstable factors. It is worth noting that self-organization is relative to other organizations. The hater-organization refers to the organization instruction and

organizational capability from the outside of the system, while the self-organization refers to the system under the condition of no external instruction, the internal subsystems can automatically form a certain structure or function according to a certain rule, which has intrinsic and inherent characteristics. The principle of self-organization explains that under certain conditions of external energy flow, information flow and material flow input, the system will form a new time, space or functional ordered structure through many subsystems.

Synergetic theory has been widely used since its publication. H.i. Gor Ansoff introduced the concept of Synergy into the field of enterprise management and developed it into Synergy Effects in enterprise strategic management, i.e., 1+l>2 Effects can be generated through Synergy. Through cooperation, enterprises can share various resources such as human resources, information, technical capacity, capital and brand within and outside the organization. Through the coordination between organizations to reduce the operating costs and external risks, and finally improve the competitiveness of the enterprise (Yibo Wang, 2013).

As the carrier for the incubation resources, a network of resources around the NE will be finally formed through the linking of all kinds of incubation resources. According to system theory, the resource network of this incubator is essentially a dynamic cooperative network system, which can be regarded as an integrated incubator system. In this system, the related resource provider will take the incubator as the key core of the incubator system. The system is independent, cooperative, competitive and cooperative. All units in the system jointly affect the quality and efficiency of the incubation of NE in the system.

In recent years, synergistic theory has been applied more and more frequently in incubator research. For example, collaboration with NE, collaboration with other incubators, collaboration with venture capitalists, collaboration with industry associations or talent agencies, and collaboration across the entire incubation network. Xin He & Tong Li applied the synergy theory in the study of the service quality of the incubator, and constructed the service quality management model of the incubator under the collaborative perspective, and concluded that the synergy between the incubator and the NE is positively related to the service performance (Xin He & Tong Li, 2016).Kejia Bi et al. applied the synergy theory to find out the mediating effect of

network synergy when studying the impact of incubator orchestration capabilities on the innovation performance of incubation networks(Kejia Bi & Haiqing Zhang & Daohong Zhang, 2017). Yewen Ma et al. applied synergy theory to define the relationship between incubators and innovation clusters, and analyzed the operational mechanisms of each other.(Zhao, 2012).In addition, synergy theory is also applied to incubator financing services. Shan Lu et al. used the synergy theory to explore the key influencing factors of the coordinated behavior of the dominant enterprises and V.C. institutions, and analyzed the evolution process, revealing the complexity of the synergistic behavior of the two. To provide a reference for further improving the ways to promote the coordinated development of venture capital (Shan Lu & Liming Zhao, 2011).

According to the synergy theory, the synergy in the system has a positive and negative direction. The positive synergy will make the entire incubation system appear in an orderly and efficient state, improving the efficiency of the entire incubation. Synergistic theory has been widely used in incubator research. The incubation system built by the incubator to obtain the incubation resources and the ability to control the cultivation process of the NE are essential for the effective synergy of the incubation resources. Synergy is one of the main functions of incubator, coordination ability strong and the weak is the basis for efficient configuration of incubation resources.

H1：synergistic ability of the incubator in the process of NE cultivation has a positive effect on the incubating-efficiency.

2.2 Enterprise life cycle theory

In 1966，A.K. Karman proposed the concept of a life cycle. Subsequently, American scholar Ichak Adizes developed the complete enterprise life cycle theory based on it and made it one of the most important theories in enterprise management research. Enterprise life cycle theory refers to the dynamic trajectory of enterprise development and growth, including several stages of development, growth, maturity and recession. The research aim of this theory is to try to find a suitable mode for the enterprise to keep its development ability (Ichak Adizes & Adizes, 1992).Generally, 12 years is used as a growth cycle and consists of four different phases, each of which is 3 years. Although the enterprise life cycle has a common rule, the changes of different

enterprises in four different small cycle stages are different, and their development paths are also different. These different changes can be summarized as follows:

1. The periodic distributions of normal type

Ascent period (3 years) → Peak period (3 years) → Stationary period (3 years) → Low tide period (3 years). About 60 per cent of companies conform to this pattern of change. Its four small cycles are relatively stable, even if the operating performance is mediocre, but as long as there are no big investment mistakes in the low tide period. Generally, it is possible to pass through 4 small cycles in a relatively smooth way.

2. The periodic distribution of wave type

Ascent period (3 years) → Peak period (3 years) → Low tide (3 years) → Stationary period (3 years). This period of change is characterized by ups and downs are not easy to grasp, the proportion of such enterprises accounted for about 20. At this stage of the enterprise, operators are generally prone to wrong estimation of the situation, desperately expanding the law of investment. But if this investment decision is wrong, the result will be devastating.

3. The periodic distribution of dull type

Fall period (3 years) → Low tide period (3 years) → Peak period (3 years) → Smooth phase (3 years). This type of change in the enterprise compared with the above two types of changes, the fall period replaces the rise period. This shows that in the 12 cycles of development, the opportunities for such enterprises to develop were less than 3 years, and the period of recession was 3 years. The proportion of such enterprises accounted for about 20.

The cause of periodic fluctuation of enterprise development is composed of external and internal factors. The underlying theoretical premise of the exogenous deterministic theory is that the enterprise life cycle should be stable and only fluctuate when impacted by external forces. According to internal cause determination theory, the enterprise's labor productivity will greatly affect the business cycle, and the change direction of the business cycle is basically consistent with the change direction of the business life cycle. The difference is that the business cycle reflects the cycle or alternative between expansion and contraction, prosperity and depression, and the longer the cycle or the longer the growth boom.

In the research of incubator's raising and incubating-efficiency of NE, scholars all realize that the development of NE also exist cycle phenomenon, so more and more scholars apply life cycle theory to the research of incubator and NE development. Based on the traditional enterprise life cycle theory, Holt puts forward four stages of NE development:

1. The pre-startup stage，i.e. The start-up preparation stage;

2. The entrepreneurship stage，i.e. The initial stage of entrepreneurship;

3. The early growth stage, namely the enterprise growth stage;

4．Advanced growth stage, i.e. NE has reached the requirements of graduation.

For NE in the first two stages, the production technology is still in the finalization, the products and services are in the experimental development stage, the market share is small, the capital is small, and the management ability is poor. Therefore, it faces a greater risk of entrepreneurship and should be worthy of incubation(David H. Holt, 1992). When studying the theory and practice of Chinese incubators, Huang Manhui and other scholars have proposed that life cycle theory has become one of the basic theories of incubator research(Huang Manhui & Huang Yan, 2001)(Bo Lv, 2014a). Mei Sun applied the life cycle theory in the research of technology-based SMEs, and proposed that the incubator service is going from the development stage of "hardware" service (office conditions and infrastructure) to "software" service (technical consultation, enterprise management, market development, etc.)(Mei Sun, 2004). Ping Liu believes that NE is in urgent need of incubators to protect their development due to their poor survivability. According to the life cycle theory, the incubator should focus on injecting a large amount of resources into the initial stage of the NE (Ping Liu, 2010). Guohua Zhu et al. applied the theory of Division of labor cooperation theory and enterprise life cycle theory to the development of incubators, and analyzed the development path of Chinese incubators(Guohua Zhu & Lin Jiang, 2007). Based on the application of the existing life cycle theory in the study of new business incubation, Qiu Fengze proposed that different enterprises in different stages are faced with different entrepreneurial risks, and the resource requirements for entrepreneurial incubation are also different (Fengze Qiu, 2016). In addition, the biggest risk in the growth of NE comes from finance, and the focus of incubator development is to help NE get through the most vulnerable start-ups. As Shown in Fig.2.2 1(Yin Kou, 2017).
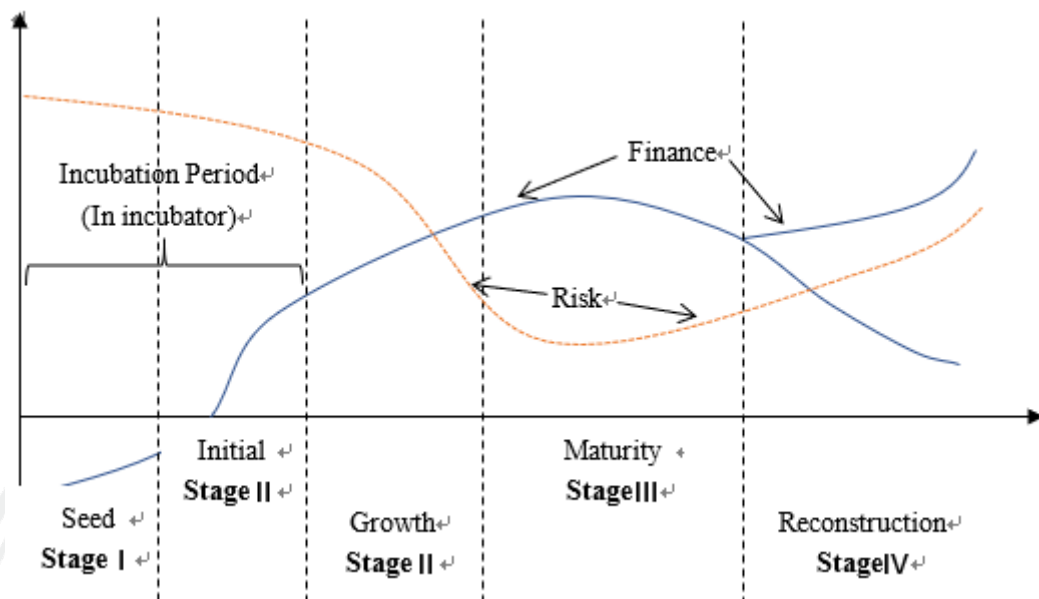
Figure 2.2 1 Finance-Risk relation in NE Growth
Source: OECD 2017 EMPLOYEES REPORT

According to the application of the life cycle theory in the current incubator research, only by fully analyzing the development law of the NE and rationally matching the required resources of each stage of the NE operation can the incubating-efficiency be effectively improved. In addition, a correct understanding of the life cycle of a NE is conducive to the incubator's understanding and definition of the incubation cycle. It is instead of investment too much resource into NE at a relatively low risk stage.

H2：The ability of the incubator to assess and judge the positioning of the NE development stage will have a positive impact on the incubating-efficiency.

2.3 Relevant theory to the efficiency research

To more fully understand the efficiency of the incubator to promote the NE development process. Here, this paper will start with the classic efficiency theory, namely Tomas·G·Rawski's efficiency explain, to more accurately grasp the connotation of efficiency. For business organizations, efficiency primarily refers to economic efficiency, which includes configuration efficiency, dynamic efficiency, and

technical efficiency. The movement of point D to point C indicates an improvement in resource allocation; the movement of point E to point C indicates an improvement in technical efficiency (TE); the production boundary curve ADCB accelerates outwards while maintaining the same basic resources, indicating an increase in dynamic efficiency. As shown in Figure 2.3 1.
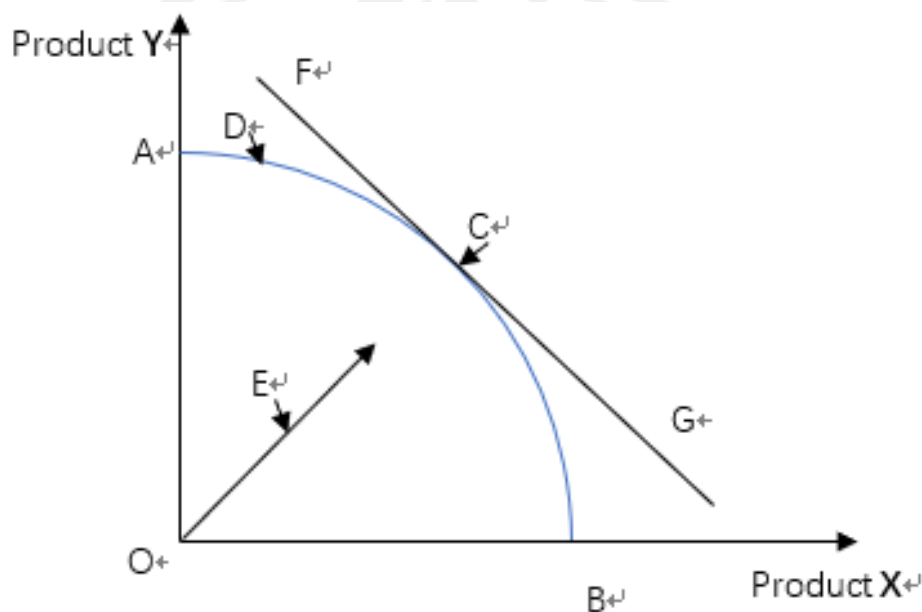
Figure 2.3 1 Tomas·G·Rawski's efficiency explain figure
Source: (Thomas G. Rawski, 1993)

In 1957, Farell proposed that the efficiency of the technical aspects and the efficiency of the price together constitute a production efficiency of the enterprise in the case of constant returns to scale. The combination of these two efficiencies is the Comprehensive efficiency, called economic efficiency. Lau and Yotopoulos （1971,1973） gives a definition of relative technical efficiency: Suppose there are two enterprises with the same input factors, and the output of the two enterprises is different, and the high-output enterprises are more technically efficient. Generally，technical efficiency is the potential ability to achieve maximum output or minimum cost under the given technical conditions when input factor conditions are certain. It refers to the availability of existing technologies. From the outside, the more adaptable the business

system is to the enterprise, the more efficient the technology, and the higher the output. In 1978，Fare and Lovell et.al further decomposes the technical efficiency (TE) into pure technical efficiency (PTE) and scale efficiency (SE). Total efficiency is divided into allocation efficiency (AE), scale efficiency (SE) and pure technical efficiency (PTE). Technical efficiency is the product of scale efficiency and pure technical efficiency. From the perspective of scale benefit, even an enterprise producing on the production possibility curve may lead to a certain loss of efficiency. However, this loss is due to the waste caused by not reaching the appropriate scale. Therefore, efficiency studies need to take scale into account. (Farrell, 1957)(Färe & Knox Lovell, 1981).Barnum et al. proposed that In the case of input and technological advancement, unit output is determined by its technical efficiency. Technical efficiency is the total technical efficiency including scale efficiency and pure technical efficiency (Barnum & Gleason, 2007). As far as the incubator is concerned, its technical efficiency refers to the maximum output or minimum input of the incubator under the given internal technical level. It reflects the frontier degree achieved by the resource utilization capacity of the incubator.

In terms of efficient. At present, pare to efficiency and X-efficiency theory are the most widely used basic efficiency research theories. Pareto Efficiency [2] Pareto Efficiency means that in the most ideal state of resource allocation, there are situations in which some people can make their situation better without causing the situation of others to deteriorate. This efficiency can be productivity or distribution efficiency. Production efficiency refers to the efficiency that the resources invested in production are fully used. Distribution efficiency refers to the distribution efficiency of production resources between producers, or between consumers, or within enterprises. Pareto efficiency means full utilization of resources for production and maximum efficiency for allocation. When using this theory, there are three prerequisites: First, the optimization of the exchange. That is, if re-trading, at this time, for any two consumers, the marginal replacement rate of any two commodities is the same, and the utility of

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2 Pareto Efficiency: The concept is named after Vilfredo Pareto(1848–1923), Italian engineer and economist, who used the concept in his studies of economic efficiency and income distribution. The concept has been applied in academic fields such as economics, engineering, and the life sciences.

the two consumers is simultaneously maximized. Secondly, the improve production. That is, economic organizations must be on the boundary of their own production possibilities. At this point, for any two producers producing different products, the marginal technology replacement rate of the two production factors that need to be invested is the same, and the output of both consumers is simultaneously maximized. Finally, the optimization of product mix, that is, the combination of products of an economic organization must reflect the preferences of customers. At this point, the marginal rate of substitution between any two commodities must be the same as the marginal product conversion rate of any producer between the two commodities.

In addition, there are many improved versions and new application methods in the development of Pareto optimal theory. The most famous is the Pareto Rule proposed by Joseph M. Juran, the 80/20 rule. According to the law, the incubator can identify the most promising NE that meet the regional economic development strategy through comprehensive assessment of the development of new enterprises. Combined with the NE life cycle theory and the 80/20 rule, it should be emphasized that the initial investment of NE in resources, improve the efficiency of the allocation of incubation resources, and reduce the cost of resource allocation.

As far as X-Efficiency Theory [3] is concerned from the relationship among production efficiency, resource allocation efficiency and X efficiency, production efficiency can comprehensively reflect the organization's resource allocation and X efficiency. In addition, it should be noted that X efficiency belongs to non-resource allocation efficiency, which is generated by human factors and organizational coordination. It is caused by an organization or motivation, that is, the root cause of X's inefficiency is the inconsistency between individuals and the organization's goals, while the organization fails to take necessary incentives. In the development of X theory, the following main views have been formed: ①for an organization, factors affecting its productivity can include resource allocation efficiency and X efficiency. If the organization adopts reasonable incentives to align individual and organizational goals,

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3 Leibenstein: Harvey Leibenstein was an American economist. One of his most important contributions to economics was the concept of x-efficiency and Critical Minimum Effort Thesis in development economics.

it may produce X efficiency and have a positive impact on production efficiency. ②
The X efficiency of an organization depends largely on the individual efforts within the
organization. An individual's level of effort is not a mechanically determined constant,
but a randomly determined variable. ③Different market structure will lead to different
X efficiency. In general, enterprises in totally competitive industries are more likely to
produce corresponding X efficiency. (Hongjun Yu, 1996).By diagnosing the X-
efficiency within the incubator, the rationality of the resource allocation of the incubator
can be judged effectively. Youjie Ding et al. applied X efficiency theory to analyze the
reasons for the low X efficiency of technology enterprise incubators in Anhui province,
and put forward methods to improve X efficiency (Youjie Ding & Ling Dai, 2012).

The x-efficiency Theory has gradually developed into one of the basic theories of
DEA research methods. In the practical application of DEA method, enterprise
economic efficiency is divided into technical efficiency and scale efficiency. When
technical degree is certain, production efficiency depends on technical efficiency.
Technical efficiency based on output is the ratio of the actual output to the most
effective possible output, while the input-based perspective is the ratio of the most
effective possible input to the actual input. Due to the existence of scale economy, the
efficiency between enterprises must consider the impact of scale. Scale efficiency refers
to the difference of efficiency caused by the change of scale, which explains whether
the input quantity of factors reaches scale economy. Pure technical efficiency refers to
the use efficiency of production factors and represents the degree of resource
conservation or waste. Technical efficiency is the product of pure technical efficiency
and scale efficiency. Samuelson's PPF[4] points out that when the economy is operating
on the production possibility boundary, it means maximum production efficiency. The
efficiency of an enterprise can be understood from two aspects, the maximum output
achieved under the given input resources, or the minimum input achieved under the
given output level. In addition, Samuelson also believes that individual production
activity is far from the production front, which can measure individual technical
efficiency.

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4 Samuelson: Paul Anthony Samuelson was an American economist and the first American to win the
Nobel Memorial Prize in Economic Sciences. PPF-Production-Possibility Frontier.

Based on the above basic efficiency theory, the incubator should avoid the phenomenon of uneconomic incubation. By building cooperation between incubation organizations and assisting NE to improve their management level, positive X efficiency can be generated in the entire incubation network. In addition, the scale economy of the incubator construction should be considered, because it will affect the performance of the incubating-efficiency. In the long run, the incubator should build an internal competition mechanism to make the NE in complete competition, effectively match the resources suitable for the characteristics of the NE through market means, strengthen business process management, and achieve the Pareto optimum of incubation elements, which will improve the overall incubating-efficiency.

The above analysis of the concepts of efficiency, technical efficiency and incubator technical efficiency is helpful to define the connotation of these concepts accurately and lays a theoretical foundation for the research of incubating-efficiency in this paper.

H3: the implementation of hierarchical supervision on the cultivation process of NE will have a positive impact on the incubating-efficiency.

H4: knowledge resource and service resource have positive effects on the improvement of incubating-efficiency.

2.4 Relating-concepts Re-defined in the Research

2.4.1 Incubator

As the most important research direction in entrepreneurial research, incubator research has not only attracted the attention of management scholars, but also attracted the attention of researchers in other fields. In the research of incubator, many other fields of concept, definition, and theory have been borrowed. The scope is wide, and the system is complex, and many original concepts of concepts change with time and place. Since the first publication of the paper on incubator research in 1985, the connotation of incubator research has not tended to be consistent, and the theory has developed slowly. These have led to uncertainty in the performance evaluation of incubators, and have also had a certain impact on the study of incubator efficiency(Theodorakopoulos, Kakabadse, & McGowan, 2014)(Albort-Morant & Ribeiro-Soriano, 2016). To make the concept and connotation of the incubator not

misunderstand, this study will reorganize and define the connotation, concept, classification and development of the incubator.

What is the incubator concept?

Incubators usually refer to institutions that provide entrepreneurs with a variety of business value-added services and public business facilities; many times, the government also acts as a policy tool to stimulate regional economic development. Some scholars believe that "business incubator is a controlled environment designed to cultivate new businesses." But so far, the concept of incubators has not reached a unified consensus in the academic world.

During the research of the incubator, many scholars tried to explain "what is an incubator" and gave different definitions. The most representative incubator definitions proposed by Smilor et al. in 1988 (Hisrich & Smilor, 1988): The incubator is an organization that helps entrepreneurs to succeed in business with the support of the government and the use of various software and hardware resources. In Growing New Ventures, Creating New Jobs: Principles & Practices of Successful Business Incubation, it is pointed out that incubators should provide personalized service support based on different types of internal new businesses and different stages of growth, which can be seen as a Dynamic configurator and resource repository for start-up resources (Rice & Matthews, 1995).Adkins pointed out that technology business incubators provide start-ups with hardware services such as office space and office facilities such as printers, fax machines, computers, etc., and provide specialized technical services and other business support for incubators based on their own resource advantages. Helping NE grow healthily while promoting regional employment and economic prosperity. It has three major advantages: excellent infrastructure and a dynamic and innovative culture, plenty of social resources (management consultancy, investment institutions and other social services), Brand effect established by incubator "(Adkins, 1996).Mian believes that incubators are the mechanism builders to assist and promote the development of technology companies. The university business incubator is a modern enterprise development tool used by universities to provide support for cultivating high-tech enterprises. (Mian, 1996).American incubator expert Lalkaka defines the technology business incubator as follows: Business incubator itself is a system that provides incubation services for rigorously selected innovative knowledge-

based businesses until they graduate. And help the scientific and technological innovation of small and medium-sized enterprises to effectively translate into products, and participate in the market competition (Lalkaka, 2003). Hengguang Li proposed that business incubator is an intelligent startup service industry that focuses on institutional framework, scientific and technological resources, intermediary services and financing services. (Hengguang Li, 2007).Jun Su and Zhifeng Yao believe that incubators are senior institutions that serve the government, universities and industries (Jun Su & Zhifeng Yao, 2007).WH Plosila and DN Allen reached the following conclusions after conducting field research on 56 start-ups being cultivated in 12 incubators: Business incubator is a platform specially established for promoting the development of start-ups. In addition to providing basic services such as physical space, office equipment and property services for NE, it can also provide services such as business management consulting, legal support, financial consulting and financing channels for enterprises. They believe that the purpose of the business incubator is to help small enterprises to successfully survive the difficult period of the initial business stage and help them to achieve profitability when graduate(Plosila & Allen, 1985).Jianhua Zhou agrees that an incubator is a management agency platform specially designed to provide a centralized office, production and research and development site, Shared public infrastructure of research and development, transportation and communication, as well as support services such as auxiliary management, professional consultation, entrepreneurship guidance, employee training, financing and policy (Jianhua Zhou, 2011).Cooper et. Al proposed an incubator, usually located in a science park and university of science and technology or affiliated to the institute, providing a platform for collaborative support. The most effective way to communicate the information resources of an incubator is through social networks, that is, building a successful and sustainable communication network has a significant impact on the incubator management (Cooper, Hamel, & Connaughton, 2012).Más-Verdú, Ribeiro-Soriano & Roig-Tierno et al. agree that the main function of incubators is to motivate entrepreneurs, promote innovation and lead regional economic development (Mas-Verdú, Ribeiro-Soriano, & Roig-Tierno, 2015). In addition, some researchers have found that the incubator provides necessary start-up support for entrepreneurs and is a tool to accelerate the success of entrepreneurship (Lai & Lin, 2015).

In the actual research, it is not difficult to find that such kind of incubation platform or organization is also diversified. "innovation center", "science and technology business incubator", "high-tech transform center ","University of Science and Technology Parks" etc. belong to the incubator field(Smilor, 1987)(Smilor, 1997).

On the other hand, many international organizations and institutions have given different explanations. UNDP[5] In the report of "Business Incubators in Economic Development-Preliminary Evaluation in Developing Countries". "An incubator is a controlled work environment designed to nurture NE. In this environment, try to create some conditions to train, support and develop some entrepreneurs and profitable businesses. "And propose "Its purpose is to create conditions for supporting, training and developing some future entrepreneurs and for-profit businesses". OECD[6] indicates that "The business incubator should cooperate with different participants to help the incubating enterprise to solve some temporary management needs. "MOST[7] refers that "The emergence of business incubators is due to the social division of labor, which aims to promote and realize the economic organization of high-tech industrialization. Its role is to provide entrepreneurs and start-ups with the necessary resources and services to reduce entrepreneurial costs and high-tech achievement conversion rates." NBIA[8] explain that Incubator for start-ups such as office space and of such as printers, fax machines, computers and other office facilities such as hardware service, and based on the resource advantage of itself to the incubated enterprises to provide specialized technical services and other various funds or consulting help, help start-ups start smoothly and healthy growth, promote employment and economic prosperity at the same time."

From the above definitions of incubators, it is not difficult to find that the definition and connotation of the incubator itself is constantly changing, and different expressions have different focuses. As the complexity of entrepreneurial activities continues to increase, the incubator's operating model and strategic goals are

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5 UNDP: The United Nations Development Programmer

6 OECD: Organization for Economic Co-operation and Development

7 MOST: Ministry of Science and Technology of the P.R.C.

8 NBIA: National business incubation association

increasingly diversified. This study has combed the research on incubators by scholars in various fields in recent years. Shown is as Table2.4 1.

Table 2.4 1 The Summary of Incubator's Concept

ORGANIZATIONS	DEFINITION & ELABORATION *Key findings*
UNDP	The incubator is a controlled artificial environment designed to nurture NE with the goal of artificially creating conditions for supporting, training and developing successful, profitable SMEs.
OECD	Business incubators should help NE address some temporary management needs and provide necessary support services, depending on the characteristics of the participants.
MOST	Business incubator is due to the social division of labor and it aims to promote and realize the economic organization of high-tech industrialization. Its role is to provide necessary resources and services for entrepreneurs and startups to reduce start-up costs and high-tech achievements conversion rate.
NBIA	As a development support tool for NE, business incubator provides necessary business hardware facilities and consulting services for new enterprises and promotes employment and economic development in the region.
THE RESEARCHERS	**DEFINITION & ELABORATION** **Key findings**
Allen & Rehman *(Wang, 2013)*	An incubator is an organization that provides cheap office space and business consulting assistance to NE.
Smilor R. W. & Gill M. D. *(Smilor & Gill, 1986)*	Through government support, incubators use their own resources, such as various venues, equipment and policies, to help SMEs and entrepreneurs start successful businesses.
Brooks *(Brooks, 1986)*	The incubator is an organization with many NE, and provides flexible leasing places, business support services and professional

	management assistance, as well as helping new enterprises to obtain seed investment.
Smllor *(Wang, 2013)*	Business incubators are not limited to the meaning of hardware, but also an innovation system designed to help NE develop.
Campbell & Allen *(Campbell & Allen, 1987)*	An incubator is a building that provides a nurturing environment for the growth and development of high-tech enterprises.
Udell *(Udell, 1990)*	An incubator is a place that can provide the growth of high-tech enterprises with less than the current market rent. It is characterized by providing Shared and centralized business services and other support services.
Longeneeker *(Wang, 2013)*	A business incubator is that uses abandoned buildings to provide a cheap office space, administrative services, management consulting and other business support services for start-ups or individuals who want to start a business, so that they can focus on their core business without being distracted from the core business. In such an organization, the enterprise can develop itself with the help of the resources of the incubator, which has great development potential.
Mian *(Mian, 1994)*	Business incubator is a mechanism to assist and promote the development of technology enterprises.
Mark et al. *(Mark, et al., 1995)*	Business incubator should provide personalized service support to incubated enterprises according to their different types and different growth stages, which can be regarded as a resource allocation center for start-ups. At the same time, business incubator is also a resource distribution center, because it can adjust the various resources required by the start-up in the incubator.
Culp *(Culp, 1996)*	Incubators are an innovative tool used to promote economic fundamentals and foster new economic development. Such a tool creates a very convenient environment for the occurrence and

	development of innovation activities. The strong support of incubators for innovation has brought about changes in regional and even national economic development models.
Adkins Dinah (*Adkins, 1996*)	Science and technology business incubators for start-ups such as office space and of such as printers, fax machines, computers and other office facilities such as hardware service, and based on the resource advantage of itself to the incubated enterprises to provide specialized technical services and other various funds or consulting help, help start-ups start smoothly and healthy growth, promote employment and economic prosperity at the same time. It has three major advantages: perfect infrastructure, active and innovative cultural atmosphere, enough social resources (management consulting agencies, investment agencies and other social services), and the brand effect established by the incubator.
S.A. Mian (*S.A., 1996*)	Business incubators are mechanisms to assist and promote the development of technology companies. The university business incubator is a modern enterprise development tool used by universities to provide support for cultivating high-tech enterprises.
Sarfraz (*Sarfraz, 1996*)	The business incubator is the role of the deployment center. The entrepreneurial instructor provides advice and guidance and assists entrepreneurs with various talents and resources needed for business activities.
Mark & Jana (*Wang, 2013*)	Technology business incubator is a kind of enterprise assistant organization. The entrepreneur provides sound suggestion, advice, and services as needed to serve as a switching center for others and resource services.
Jing Junhai (*Jing, 1998*)	The incubator is a system space with the service system for the survival and growth of NE.
Zhang Jinan & Zhang Chaoying	In China, science and technology business incubator is called high and new technology entrepreneurship service center, which is a

(Zhang & Zhang, 1999)	specialized institution promoted by the government under the condition of market economy.
Cao Xiyu *(Cao, 2001)*	Business incubator is a new type of social and economic organization. By providing high-tech enterprises with a place to start their own businesses, an environment, and the support of participating in entrepreneurial management, the risk of new high-tech enterprises is greatly reduced, and the survival rate and success rate of new enterprises are high.
Li Gang et al. *(Li, Zhang, & Chen, 2001)*	An incubator is a social service organization that provides commercial support conditions and services through its resources or through the network it builds and specializes in fostering the development of start-up businesses.
Rustam Lalkaka *(Lalkaka, Technology Business Incubation , 2006)*	Business incubator itself is a system that provides incubation services for critically screened innovative knowledge-based enterprises until they graduate successfully and help them effectively transform their scientific and technological innovations into products and participate in market competition.
Ding Kun & Ling Guoping *(Ding & Ling, 2003)*	Technology Business Incubator is an ideal organization that assists startup organizations in coordinating all kinds of required business resources through various channels and stimulating their potential.
Qiang Lin *(Qiang, 2003)*	An incubator is a socio-economic organization that implements an incubation mechanism.
Jin Jialin et al. *(Jin, Li, & Liu, 2004)*	The incubator is to arrange some enterprises in the entrepreneurial stage to a certain area for unified training. Develop start-ups by providing management expertise, financial support, and key professional resources. Such a region will provide these businesses with the services they need to start the business.
Ming Dajun *(Ming, 2004)*	Technology business incubator is a new kind of social and economic organization. By providing Shared facilities in research and development, production, operation and office, and providing support in policies, financing, laws and marketing, the

	transformation of scientific and technological achievements can be promoted, the risks and costs of entrepreneurship can be reduced, and the survival rate and success rate of enterprises can be improved.
Rustam Lalkaka (Lalkaka, Technology Business Incubation , 2006)	A business incubator is a business unit whose initial development should be supported by the government, such as providing low rent (or rent-free). Incubators generally have buildings and a certain amount of money, are service-oriented, and rely on the help of universities and research institutes. They are closely related to informal organizations such as society.
Hengguang Li (Hengguang, 2007)	An incubator is a system space for NE to gather and provide services needed for their survival and growth. It is an intelligent startup service industry that focuses on institutional framework, scientific and technological resources, intermediary services and capital preference. Its fundamental characteristic is system frame, intermediary service system, a kind of intelligence service industry.
Jun Su & Zhifeng Yao (Su & Yao, 2007)	The incubator is a senior institution that serves the government, university and industry.
Bergek & Norrman (Anna & Charlotte, 2008)	An incubator is an organization that provides start-ups with Shared space, Shared support services, expert advice, business support and network support.
Hong Yin (Hong, 2009)	An incubator is a social and economic organization providing NE with various intangible and tangible services and resources, including essential resources (site, capital, management, etc.) and environmental resources (policies, information, culture, brands, etc.).
WH Plosila & DN Allen (WH & DN, 2010)	Business incubator is a platform specially established for promoting the development of start-ups. In addition to providing basic services such as physical space, office equipment and property services for NE, it can also provide services such as

	business management consulting, legal support, financial consulting and financing channels for NE. They believe that the purpose of the establishment of technology business incubator is to help small enterprises to start businesses, promote NE to ride out the difficult period in the early stage of entrepreneurship, and help them to graduate and realize profits.
Jianhua Zhou *(Jianhua, 2011)*	Business incubator is designed for start-up companies provide central office, production, research and development area, the Shared public infrastructure development, transportation, communication, and provide supporting a coaching, staff management, professional consulting, training, funding, policy support, such as service platform for the management organization, and promote the rapid and sound growth of enterprise a comprehensive service system or network platform.
Cooper et.al *(Cooper, Hamel, & Connaughton, 2012)*	Business incubation organizations, usually located in a science park and affiliated to a university of science and technology or research institute, provide a platform for collaborative systems to support integration. It has a special role for the country, enterprise, venture capital and society, and it plays a special role in stimulating entrepreneurship.
Más-Verdú et.al. *(Mas-Verdú, Ribeiro-Soriano, & Roig-Tierno, 2015)*	The mission of an incubator is mainly to inspire entrepreneurs, promote innovation and lead regional economic development.
Wen-Hsiang Lai *(Lai & Lin, 2015)*	Some scholars have found that the incubator provides the necessary start-up support for entrepreneurs and is a tool to accelerate the success of entrepreneurship.

Incubator taxonomies

In the development process of incubators, various types of incubators emerge one after another. Currently, the mainstream is divided into four categories:（1）Business

incubator: most of these incubators are self-financing and profit-oriented.（2）Non-profit-oriented incubator: this kind of incubator is mainly of certain policy significance, industry orientation and public welfare nature, without profit pressure.（3）Academic incubator: it mainly focuses on university science and technology parks and industrial parks, aiming at promoting the combination of production, study and research, and promoting the industrial operation funds of new technologies or patents all or part of which come from the affiliated organizations.（4）Investment incubator: it is usually co-founded by investment institutions and other organizations. It emphasizes innovation and profit based on venture capital. The more common classification in China are as below: (1) Comprehensive business incubator mainly provides low-rent office space, business establishment procedures, communication between enterprises and the government, implementation of corporate preferential policies, etc. Such incubators have no special requirements for the industry in which the new business is located and are usually the primary choice for the new business. (2) High-tech incubator focuses on the incubation of enterprises in a certain professional technology field. It has a Shared technology platform of the same industry or the same subject area and provides professional technical support services. (3) The talent-oriented incubator is a business incubator established by classifying the attributes or categories of talents, such as the overseas study and returning personnel Business Park. Mainly provides the special talent's preferential policy docking service. (4) Service incubators of multinational enterprises mainly target at NE with international business or with frequent international cooperation. (5) Virtual incubators generally use the Internet as a tool to provide relevant consulting services to the incubated enterprises, as well as technical services such as promoting advanced manufacturing technologies and finding production and processing bases for the incubated enterprises. (6) The parent-platform incubator is generally funded by large groups and is closely related to the strategic goals of the group. To a large extent, it is to cultivate enterprises for the development of the group itself, and it is also the main carrier for entrepreneurship in the current position (Fengze Qiu, 2016).From the perspective of the development status of incubators in China, they are still dominated by Comprehensive business incubator, but both the

talent-oriented incubator and professional incubators are increasing rapidly to adapt to the adjustment of industrial structure.

In addition, it is classified according to the characteristics of the incubator development stage. （1） Born stage （1959～1979）,This period mainly by the enterprise's business intermediary services, real estate technology transfer.（2）Early growth stage （1980～1989）,Multi-functional incubators and social enterprise incubators have emerged.（3）puberty （1990～1999）,the incubator built by industry or specialty.（4）Mature stage （After 2000）,There are professional business incubators and virtual incubators, such as R&D incubators and financial investment incubators (Hongwei Wang, 2008).

In 1990, Allen & McCluskey divided the development of the incubator into three stages according to its functional attributes, and then divided the incubation task into two target levels according to its importance. Therefore, the incubator development model has become the recognized model and theoretical basis of the incubator research (Allen & Mccluskey, 1991).

Based on the research of various researchers, this paper obtained the scientific classification of incubator, as shown in Table2.4 2.

Table 2.4 2 Conceptual Framework of Incubators' Structure

	REAL ESTATE DEVELPMENT	**BUSINESS DEVELPMENT**	**VALUE-ADDED DEVELPMENT**	
INCUBATOR TAXONOMY	*For-Profit*		*Non-Profit*	
	Property Development Incubators;	Capital Incubators;	Corporation Incubators;	Academic Incubators;
PRIMARY OBJECTIVE	Real estate appreciation; Sell Proprietary to tenant;	Capitalize Investment opportunity;	Job Creation; Promoting the Entrepreneurial Potential;	Faculty-Industry Collaboration; Commercialize Research;

SECONDARY OBJECTIVE	Create opportunity for technology transfer; Create investment opportunity;	Product development;	Generate Sustainable; Diversify Economic Base; Bolster Tax Base; Utilize vacant facilities; Strengthen Work-net;	Strengthen Service & Instructional Mission; Capitalize investment opportunity; Strengthen Community Relations;

The definition, connotation and classification of the existing incubator research are combined with the purpose of the research. The new definition of business incubator in this study is: modern business incubator is the concept of a pan-intermediary service organization, which is a platform organization providing a series of services and resources needed for the development of NE. The business incubator is which brings together regional economic resources, policy resources, human resources, intellectual resources, technological resources, to reduce cost of resources integration, and to provide the office space and property, management support, financial support, financial support, the support industry planning, policy support, business network, and a series of training services, and to emphasize the new industry guide, promote trade business resources, promote industrialization of new technology, the formation of innovation and entrepreneurship collaborative business infrastructure platform.

H5：The incubation efficiency of an incubator is related to its funding source and property rights.

Development studies of incubators

The development of incubators is a systematic, continuous process that shifts from monomer incubation to network incubation; from focusing on the services and products of individual incubators to improving the efficiency of research incubation.

Phillips believes that the particularity of the incubator depends on its own characteristics. (Phillips, 2002): ①Incubation is mostly based on high-tech innovative

enterprises, which can fully provide technical resources of universities and scientific research institutions, and promote the commercialization of new technologies.②Create a controlled business environment that provides NE with a range of hardware and software services.③Reduce the entrepreneurial cost of entrepreneurs, improve the survival rate of NE, and promote the goal of regional economic development.

Carayanni & Zedtwitz pointed out in 2005 that with the development of the Internet, the virtual business incubator will develop rapidly as a new incubation model(Carayannis & Von Zedtwitz, 2005). Bøllingtoft & Ulhøi proposed the network development trend of the incubator through research and pointed out that the incubator should build a network platform. All the incubating enterprises can realize information exchange, resource sharing, cooperation and innovation through the network platform of the business incubator, and finally realize new a symbiotic relationship between enterprises (Bøllingtoft & Ulhøi, 2005).

Wang Shuilian pointed out that Chinese incubator research mainly focuses on four core issues: the location of the incubator, the business mode of the incubator, the organization of the incubator and the evaluation of the incubator (Shuilian Wang, 2013).The incubator has the attributes of public goods in China, so the incubator will have certain advantages in the system. The government will give some support whether it is profitable or not (Fengtao Liu & Lumei Wang, 2005).As the competition in the incubator market intensifies, more and more incubators focus their management on improving the incubating-efficiency of NE and try to form an effective network of incubation resources through the cooperation of incubators.

H6：Whether the incubation resources are layered, and the degree of network connection of the incubator has a positive influence on the incubating-efficiency.

Based on the above research on incubator development, the main functions of the incubator are as follows:

1. Basic business functions: providing low-cost office space, equipment and property services.
2. Functions of startup services: government policy interpretation, startup capital subsidy, capital and talent connection, operation management and industrial

development consulting support, financial planning support, entrepreneur training services, etc.

3. Resources and network functions: community resources, industrial resources, human resources, financial resources, policy resources, scientific and technological resources, etc.

4. Function of innovation and industrialization: patent consultation and docking service, scientific research institute cooperation docking service, scientific and technological product marketization consultation service, new technology industrialization consultation service and so on.

In addition, sustainable development is also the focus of research on incubator development in recent years. Sustainable development embodies a strong vitality of an organization, and also illustrates its health and stability (Heyin Hou & Fangfang Ge, 2010).

Any organization needs a stable environment as a cornerstone for efficiency improvement. For incubators, sustainable development is also the basis to ensure the incubation efficiency, which provides time resources for improving the incubating-efficiency of NE. Roberto & Giuseppina said that sustainable development is of vital importance to incubators, providing a conceptual approach for the resource sharing theory between incubators, helping to solve the imbalance of development of incubators in various regions and realizing resource sharing between incubators. The coordination and cooperation between the incubator and universities, scientific research institutions, government departments and related institutions can provide continuous impetus for the development of the incubator (Hernández & Carrà, 2016).

From the perspective of the development track of American incubator industry, each iteration is a fusion of social resources and strengthens the networking of incubation resources (Bruneel, Ratinho, Clarysse, & Groen, 2012). After studying the business model of the incubator systematically, Li Wenbo imply that the regional unique situation of incubation resources was unique, and the incubating-efficiency was improved through the collaborative innovation of the incubator network, so as to continuously incubate NE (Wenbo Li, 2014). The sustainability of the incubator is also reflected in its profitability. The operation of an incubator should not be just about spending money. In the increasingly fierce competition, without its own profitability,

financial difficulties will be caused regardless of whether it is funded. It is not enough for an incubator to rely on government investment and financial subsidies. It needs to constantly increase capital to achieve its sustainable development (Yongkun Ma, 2013).

In addition, Cui & Jiang pointed out in the research of incubator sustainable development that the sustainable development of the incubator is a systematic problem, and the key is to integrate government resources, new enterprise resources and other intermediary service organization resources into the resource network of the incubator and develop in coordination with the incubator. He sees incubators as complex open systems that adapt to their organization (Xiangmin Cui & Nan Jiang, 2013).

With the development of Internet technology, it gradually breaks the physical constraints between incubators, increases the number of incubation resources, facilitates the circulation of resources and information, and promotes the improvement of incubating-efficiency. Of course, another trend of incubating resource construction is to highlight the economic, social and cultural characteristics of the region. From previous studies, the next development stage of the incubator will focus on resource networking, development sustainability and high incubating-efficiency. This study proposed the characteristics and development framework of the incubator, as shown in Table2.4 3.

Table 2.4 3 Configuration & Development Framework of Incubators

TAXONOMIC	Publicly-sponsored INCUBATOR I	Publicly-sponsored INCUBATOR II	For-profit INCUBATOR
Funding sources	From government Funding Aid.	From community, university or research institution Funding Aid.	From Enterprise, Capital investors or other Profit-Organization Funding Aid.
Political & service	It will focus on supporting policies for employment, taxation, start-up capital and	It pays attention to the fund support of talent introduction, patent and new technology	It pays attention to basic services such as tax, site, facilities and

enterprise establishment services.	application, and is more inclined to the cultivation of high-tech enterprises.	equipment, emphasizes business convenience and industrial policy consultation, attaches importance to venture investment and return, and is more inclined to cultivate NE in the industry where the fund self-help is located.
Regional contribution	It will address employment, lower the threshold for starting a business, increase economic vitality in the region, and improve the region's business environment.	Promote regional science and technology development and retain or attract high-end talents.	To provide experimental space for regional industrial transformation or the development of large enterprises, promote innovation and promote capital circulation.
Selection criteria	As an ombudsperson;	As a Partner;	As an investor

	The management & entrepreneurship Experience. The team professional background; Start-up financial strength. BP executable; et al.	The some as Publicly-sponsored I incubator. But emphasis is placed on the scientific and technological content of the project.	The some as Publicly-sponsored I incubator. But emphasis is placed on BP executable.
Incubatee	No matter the nature of the incubator, the comprehensive incubator does not limit the industry of NE. Publicly-sponsored I incubator has a large proportion.		
	Regardless of the nature of the incubator, the professional incubator should be limited to the industry of NE. Publicly-sponsored II incubator & For-profit incubator has a large proportion. For-profit incubator will push NE to break up or reorganize and accelerate the scale of NE.		
Developing trend	Resource owners translate to resource coordinators. Emphasis on links and control, not ownership. Oriented by industry or technology group and combining with community characteristics, it is developing towards regional professional incubator. Strengthen the incubation network, break through the physical constraints of a single incubator, and become a resource node in the incubation network. Higher incubating-efficiency is required to improve their profitability and sustainable development ability. Focus on the cultivation process of NE rather than single financial indicators.		

2.4.2 New Enterprise

There are various names for for-profit organizations run by entrepreneurs, and researchers or organizations do not have a uniform standard for such organizations. In general，the start-ups will be called New Enterprise、New Venture、New business、incubated-enterprise and so on. But they share common characteristics：①It has a plan for starting a business.②It is still in the initial stage of business, but it has formed a

team or organization.③Start-ups have been operating for more than a year, but have yet to generate sales revenue (Yuli Zhang & Dan Long & Jun Yang, 2011). Others, some scholars also analyzed and defined the development stage of NE. The organization shall operate for less than 8 years and be identified as a NE, while the organization shall operate for less than 3 years and be divided into its initial stage (Schuster, 2014)(Leung, Zhang, Wong, & Foo, 2006) .

To make the concept of a for-profit organization in the incubation stage of the incubator not cause ambiguity and confusion in the paper, this study identified a for-profit organization by entrepreneurs as start-ups, that is being cultivated in the incubator, and it will be called New Enterprise, Referred to as NE.

2.4.3 CPSED

Prof. Paul Reynolds from BABSON COLLEGE launched PSED[9] in 1998，Is an influential international research project in the field of entrepreneurial research. PSED is designed to enhance the scientific understanding of how people start businesses. The projects provide valid and reliable data on the process of business formation based on nationally-representative samples of nascent entrepreneurs, those active in business creation(University of Michigan, 2017). In 2009, based on the PSED design plan, China implemented CPSED under the actual conditions of combining Chinese entrepreneurial activities and research. Currently, CPSED can be more fully reflect the current situation of Chinese entrepreneurship. It also proposes that in a specific social, political and economic environment, the interaction between key elements such as entrepreneurs, opportunities, processes, and atmosphere is the key to creating and shaping entrepreneurial results for NE. The CPSED conceptual model is shown in Figure 2.4 1 (Da Costa, 2012) The CPSED project has accumulated a large amount of basic data on China's entrepreneurial research, and it can be said that it has become an important reference tool for researching Chinese entrepreneurship.

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9 PSED: The Panel Study of Entrepreneurial Dynamics (PSED) research program
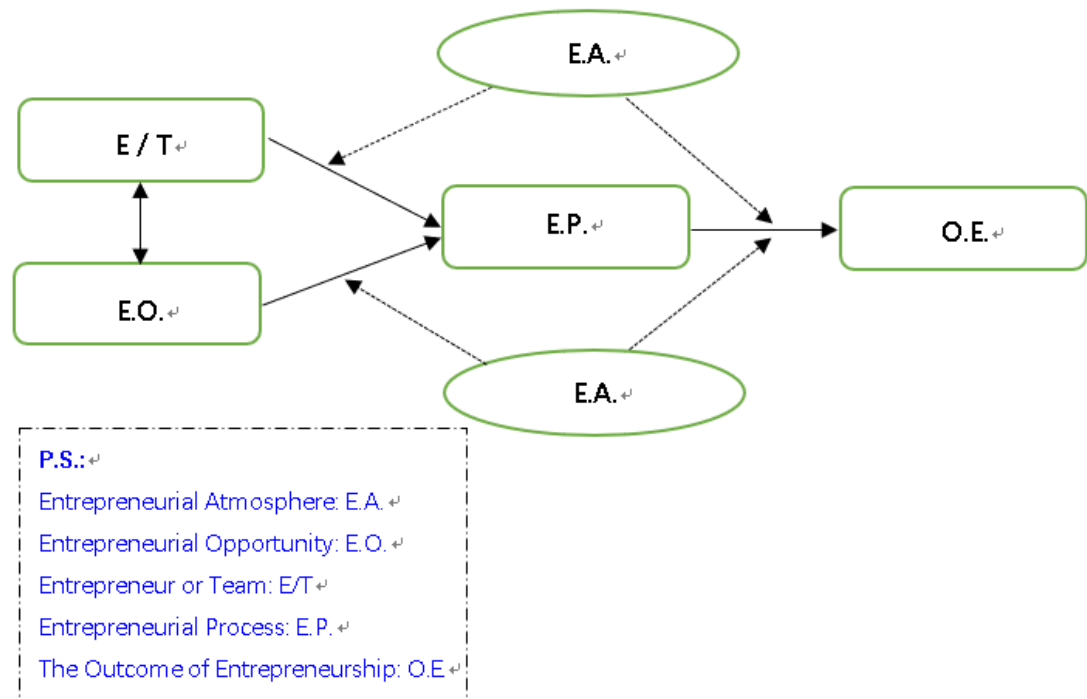
Figure 2.4 1 The Conceptual Model of CPSED
Source:(Da Costa, 2012)

2.5 Review of Incubation & incubating-efficiency

From classical economists to management experts and social managers, entrepreneurial activities are the source of social wealth creation. To effectively promote the economic development of a region is crucial to the basic incubation of NE. Therefore, the research on incubators has gradually become the foundation and core of innovation and entrepreneurship research.

2.5.1 The Characteristics of Incubation Analysis Base on Entrepreneurial Factors

As an important branch of entrepreneurship research, incubator cannot be explored without the support of entrepreneurship research. The core purpose of entrepreneurship research is to analyze the characteristics of entrepreneurship and the environmental factors that influence entrepreneurship, to find out its influence on the cultivation of NE by analyzing the influencing factors of the entrepreneurial activity, the efficiency of the incubator can be improved.

The impact of environmental factors on the incubation activities of NE

Davidsson pointed out that the incubator operation is based on the entrepreneurial activity, including the consensus judgment of the process, namely the interactive matching between the four elements of entrepreneur, entrepreneurial opportunity, entrepreneurial behavior and entrepreneurial environment (Da Costa, 2012). Entrepreneurship cannot be conducted without the specific social environment. The essence of an incubator is to simulate the artificial environment suitable for the growth of new enterprises, and through the adjustment of the simulation environment, make new enterprises interact with the outside world, and finally make new enterprises capable of commercial competition under the pure market conditions. For an incubator, the ability to build an entrepreneurial environment is the key to its competitiveness and the basis for its efficient utilization of environmental resources and improvement of incubating-efficiency. Therefore, many researchers studying incubators and entrepreneurial behavior have analyzed the entrepreneurial environment. It is generally believed that the entrepreneurial environment, which can provide the necessary resources for the entrepreneurial process, mainly includes: The main body of entrepreneurial behavior, entrepreneurial organization, environment and process, various factors that need to be faced and can be utilized in the process, etc. (Gartner, 1985)(Gnyawali & Fogel, 1994) (Specht, 1993).

Wang Xiufeng concluded in his research on entrepreneurial environment:①The perception of supportive environment will have a positive impact on the level of entrepreneur, venture capital and entrepreneurial motivation.②Investment capital has a significant impact on the growth of new enterprises.③The perceived level of entrepreneurial motivation in the environment has no significant effect on the competitive advantage of NE.④Entrepreneurial supportive environment has no direct impact on the competitive advantage of NE, but it can indirectly affect the competitive advantage of NE (Xiufeng Wang & Huajing Li & Yuli Zhang, 2013). The results of this study show the importance of incubators to support capital resources in the incubation process of NE. Using data from NES [10] and APS [11], Alvarez,Urbano, Coduras, and Navarro shows that both informal factors (cultural and social norms,

10 NES: Spanish National Expert Survey

11 ASP: GEM Adult Population Survey

perceptions of entrepreneurial opportunity and the social image of an entrepreneur) and formal factors (intellectual property rights) influence entrepreneurial activity. Informal factors have a greater impact on entrepreneurial activity. In terms of gender, women's entrepreneurial activities and whether they can get social support from others have a significant impact. Universal education and higher education affect only male entrepreneurial activity (Alvarez, Urbano, Coduras, & Ruiz-Navarro, 2011). It can be seen that whether the policy, system, social norms, culture and other factors in the regional environment support entrepreneurial activities has an impact on the level of entrepreneurial activities, which can be summarized as the support of entrepreneurial environment for entrepreneurial activities (Huajing Li & Yuli Zhang & Xiufeng Wang, 2014).

The influence of risk perception factors on the incubation of NE

The activity level of a region's entrepreneurship activities, to some extent, reflects the degree of support of the region's entrepreneurship environment for the development of new enterprises, and it is also the basis for promoting the circulation of entrepreneurship elements, accelerating the development of incubators and improving the efficiency of incubation. And entrepreneurial activity and environmental risk degree has a certain correlation. Gelderen and Bosma survey findings, People's perception of the macro environment will have an impact on whether to launch entrepreneurial activities. If potential entrepreneurs perceive a higher risk of entrepreneurship and have no way to reduce the risk, they are more likely to give up their entrepreneurial activities. Start-up capital has a negative impact on entrepreneurial activity. The smaller the start-up capital required for entrepreneurial activity, the more likely the individual is to start a business. People in manufacturing are more likely to launch entrepreneurial activities (Van Gelderen, Thurik, & Bosma, 2006). Wagner and Sternberg used REM surveys to find that entrepreneurial risk aversion and higher land prices had a negative impact on entrepreneurial activity. The faster the region develops, the more entrepreneurial activity there is(Wagner & Sternberg, 2004).

The level of the entrepreneur's perception of risk can reflect the confidence in the expectation of success, which is the driving force for the development of new enterprises and one of the important factors to attract external investment. The incubator should focus on reducing the perception of environmental risk of the entrepreneur and

the provider of incubation resources and increasing the confidence in the success of the NE while creating a stable cultivation environment. At the same time, it is also the core ability of the incubator to attract various resources to intervene, which is also the foundation of maintaining the incubator with high incubating-efficiency.

The impact of policy elements on the incubation of NE

In addition to the impact of risk perception in the environment, government policies are also an important factor influencing entrepreneurial activities. Study such as Meek, Pacheco and York suggest that, the central system (mainly refers to the policies formulated by the government) or the non-central system (mainly refers to the general norms of the society) has an impact on entrepreneurial activities. They found that both systems played an important role in facilitating the creation of new businesses. The effectiveness of the government's entrepreneurial support policies on entrepreneurial activities depends on the degree of support from social norms in the environment in which the entrepreneurs are located(Meek, Pacheco, & York, 2010). After Sternberg and Wennekers studied seven articles from the 2004 GEM research conference, they found that entrepreneurship is a regional activity, influenced by the social network within the region and regional policies. The level of entrepreneurial activity changes at different stages of economic development. There is a u-shaped relationship between the level of entrepreneurial activity and the level of economic development. With the gradual improvement of economic level, the level of entrepreneurial activity declines gradually and then rises gradually. (Sternberg & Wennekers, 2005).Li and many other scholars also pointed out that when the policy environment is supportive to entrepreneurial activities, it will promote the level of entrepreneurial activities in the entrepreneurial environment. When the policy is not supportive, the degree of entrepreneurial activities in the entrepreneurial environment will be suppressed (W. Li, 2002)(Davidsson & Henrekson, 2002)(Kim, Kim, & Yang, 2012).

From the above research, it can be inferred that for a large country like China, when the social, economic, cultural, policy and other environmental factors are quite different in different regions, the rules of entrepreneurial activity should be studied in different regions, rather than. As a base for foster NE, the incubator should help new

enterprises obtain policy support to the maximum extent according to the characteristics of regional policies and build policy incubation resources with regional characteristics.

The influence of institutional factors on the incubation of NE

The institutional arrangement of a region is also an important factor influencing the incubating-efficiency. By comparing the degree of entrepreneurial activity in Russia and central European countries, Kontorovich found that the rate of NE creation in central European countries was higher than that in Russia. According to the research of Dean and Meyer, there is a negative influence relationship between market entry barriers caused by unreasonable institutional arrangements and entrepreneurial activities (Dean & Meyer, 1996). The net creation rate of new businesses in Russia has stagnated since 1994, mainly due to excessive taxation, excessive regulation and high barriers for entrepreneurs to enter the market (Kontorovich, 1999). According to the institutional and policy analysis of Sweden by Davidsson and Henrekson, the reasons for the low level of entrepreneurial activity in Sweden are as follows: Some areas are closed to entrepreneurs, labor laws restrict the free flow of labor, and institutional restrictions on entrepreneurs(Davidsson & Henrekson, 2002). Klapper, Laeven and Rajan studied the impact of market entry controls on the creation, average size and growth of new companies. As a result, high costs of regulation curb the creation, size and growth of new enterprises, which force new enterprises to have economies of scale, which slow the growth of new enterprises and make it difficult to improve the quality of assets. This effect is even more pronounced in industries with high rates of spontaneous entry (Klapper, Laeven, & Rajan, 2006).Bruce and Deskins studied U.S. state tax policy from 1989 to 2002. Their research found that higher taxes have a negative impact on the level of entrepreneurial activity in the state. These taxes include: Individual income tax, property tax, inheritance tax, gift tax, etc.(Bruce & Deskins, 2012). This study found that these systems were designed for mature enterprises, not new enterprises. Facing the challenges brought by the institutional arrangement, the prerequisite for the incubator to improve the incubation efficiency is to lower the threshold of entrepreneurship entry and reduce the impact of policy and system fluctuations on the development of NE, which is also the incubator's mission as the entrepreneurship environment regulator and specific public policy tool.

The impact of opportunity factors on the incubation of NE

As the starting point of entrepreneurial activity, the identification and exploration of entrepreneurial opportunities has always been the focus of entrepreneurship research. As for the incubator, whether it can take advantage of its own resource advantages to explore new entrepreneurial opportunities of NE and make NE achieve explosive development through the resource allocation of the incubator is the key to the improvement of the incubating-efficiency of the incubator. Kirzner believes that opportunities arise from market demand, or identification of market segments and underutilization of available resources (Kirzner, 1997). Through the research on innovative entrepreneurs, a number of scholars have discovered four aspects of entrepreneurial opportunity identification:①No matter whether the entrepreneur has professional experience or not, he/she can identify the entrepreneurial opportunities derived from resource incentives by searching the environmental resource system. ② Relevant industry experience of entrepreneurs will be accumulated in work out some Tacit knowledge and related social networks, make they can make full use of their existing resources to identify opportunities; Entrepreneurs with no relevant industry experience mainly find opportunities in the process of solving existing problems or filling unmet needs. ③ The entrepreneurial opportunity of entrepreneurs with entrepreneurial experience is mainly based on problem orientation, while the entrepreneurial opportunity identified by entrepreneurs without entrepreneurial experience is mainly based on resource motivation. ④No significant differences were found in the main methods of opportunity identification for entrepreneurs with or without work experience and entrepreneurial experience, and they mainly relied on systematic search to find opportunities(Yuli Zhang & Dan Long & Jun Yang & Li Tian, 2011). In addition, based on CPSED survey data, Li Huajing et al. found that the recognition of entrepreneurial opportunities is also affected by the ethical awareness of entrepreneurs. The study pointed out that the higher the ethical behavior level of entrepreneurs, the greater the promoting effect of the identification of entrepreneurial opportunities on the utilization of entrepreneurial opportunities (Huajing Li & Yuli Zhang & Xiufeng Wang, 2014). From this point, it can be noted that the incubator should strengthen the guidance of the entrepreneur's entrepreneurship ethics awareness and stimulate NE to discover new entrepreneurial opportunities through relevant

industrial resources. In other words, the incubator can improve the incubating-efficiency by increasing entrepreneurship training for NE.

The impact of incubation process management on NE incubation

As entrepreneurship relies on management, the object of entrepreneurship study is NE, which is different from the general enterprise studied in management. The mature management methods of enterprise performance management cannot be directly applied in new enterprises. Therefore, the measurement of NE performance is always a difficult problem in entrepreneurship (Davidsson & Steffens, 2011).For the first time, PSED uses actual sales revenue to measure NE performance. This requires the incubator to pay attention to the dynamic requirements of NE process performance, not only the static indicators of the results. (Brush, Manolova, & Edelman, 2008).In 2008, Liao and Welsh divided the entrepreneurial activity process into four parts: preliminary planning, resource input, marketing activities and legalization activities, and pointed out the importance of resource matching in promoting the development of entrepreneurial activities and the growth rate of entrepreneurial organization (Liao & Welsch, 2008). This also puts forward the specific requirements for the incubator to invest the incubation resources in different stages of the development of NE. It also puts forward some ideas on how to evaluate the performance of the incubation process of NE and improve the overall incubating-efficiency.

Characteristics of entrepreneurial activity in China based on CPSED research

According to CPSED survey, Chinese Nascent Entrepreneurship Prevalence is 4.77%, the number per hundred adults' entrepreneurs almost five people. In terms of the market area served, nearly half of NE serve the local market (47.6%), 22.3% serve the local market or 23.8% serve the national market, and 14.5% of NE are ready to enter the international market. Others, CPSED has also studied the relationship between factors such as entrepreneur, entrepreneurial opportunity, entrepreneurial process and entrepreneurial atmosphere in a specific external macro environment. It is pointed out that under the condition of matching the entrepreneur with the entrepreneurial opportunity, the entrepreneur can improve the success rate by taking proper entrepreneurial process (Huajing Li & Yuli Zhang & Xiufeng Wang, 2014). CPSED also highlighted the differences in new enterprise attributes caused by the entrepreneurial process, and described the characteristics of new enterprises in

entrepreneurship orientation and resource base, thus helping to discover the formation mechanism of high-end entrepreneurship and new enterprise attributes with entrepreneurship orientation and resource base as the connotation (Yuli Zhang & Dan Long & Jun Yang, 2011).Based on CPSED data, Li Huajing et al. found five types of demand factors for the development of NE in China: ①Then reduce the difficulty of obtaining venture capital and expand the channels of venture capital.②Open more areas of access, remove barriers to market access and reduce administrative controls.③It needs more policies to encourage entrepreneurship, lower taxes and regulate competition.④Further increase the proportion of technology and education input.⑤ Create a supportive social environment. The resource integration of these five major needs can also be seen as the dimensional basis for improving the efficiency of NE incubation(Huajing Li & Yuli Zhang & Xiufeng Wang, 2014). In 2001, Baum et al. proposed that entrepreneurial expectations as an important cognitive behavior of entrepreneurs have an important impact on new entrepreneurs' persistence or abandonment of entrepreneurship. In the incubation process of the new enterprise, the incubator should pay attention to the entrepreneurial expectation of entrepreneurs(Robert Baum, Locke, & Smith, 2001).GEM[12] pointed out in its 2009 report that entrepreneurial expectations reflect the inherent nature and characteristics of entrepreneurial activities and measure entrepreneurial expectations from three dimensions: growth expectations, innovation and exports. Expectation gap is an important concept in management psychology. The so-called "expectation gap hypothesis" refers to "Unmet Expectations increase the probability of employees' leaving". Based on this research, in 2011, Song Zhenggang introduced the expectation drop hypothesis and used CPSED data to generate four variables. Entrepreneurial expectations; Innovative performance; Expectation gap;) to test. The results show that the expectation gap hypothesis to explain China's Nascent Entrepreneur does not apply to abandon the entrepreneurial behavior. The most significant impact on the abandonment of entrepreneurship is determined by the actual results of entrepreneurial activity, That is, the insupportable loss brought by entrepreneurship leads to the

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12 GEM: Global Entrepreneurship Monitor

abandonment of entrepreneurship(Gang Song, 2012). As Saras said, entrepreneurs pursue losses that can be borne, rather than maximization of expected returns. The unbearable losses brought by entrepreneurship or the insurmountable obstacles of action lead to the abandonment of nascent entrepreneurs (Sarasvathy, 2001).

From the characteristics of China's entrepreneurial activity, this study believes that the incubator should combine factors such as China's social environment, system and regional policies to provide necessary support for entrepreneurs to overcome obstacles in their actions, including growth constraints such as services, policies and resources, to gain policy space for entrepreneurs. Providing policy makers with real data on new business development; reduce startup losses for new businesses. Providing a relatively stable and continuous entrepreneurial environment for NE is the premise and foundation to improve the incubating-efficiency.

Key findings as above all

Based on the analysis of entrepreneurial activity characteristics, the paper concludes that the influence of entrepreneurial behavior characteristics on the incubating-efficiency is as follows：

1. The characteristics of entrepreneurship are regional, and entrepreneurial policies and services are also regional.

    For big countries like China, entrepreneurship research should be done regionally, not nationally. In terms of resource integration, the incubator should also conform to the characteristics of regional economic development and give priority to the construction of incubation resources within the region.

2. The incubating-efficiency is related to the matching degree of resources at the stage of NE entrepreneurial development.

    According to the characteristics of the life cycle of a NE, the incubator should allocate resources according to the different development stages of the NE. By reasonable matching, the incubation process can be accelerated, and the incubating-efficiency of the incubator can be improved.

3. The incubator can establish selection criteria for NE to enter the incubator according to its own resource characteristics, to improve the initial quality of new enterprises' incubation.

Characteristics of the NE and entrepreneurial team: ①with the establishment of a legal entity, the sales income can be achieved within 6 months or more within a year.②Within a year of its establishment, it has been profitable for 6 months or more.

4. According to the trajectory of the entrepreneurial activities of NE, the incubation resources can be designed into four dimensions of resource groups, that is, the incubation resource groups that serve four dimensions: entrepreneur, entrepreneurial opportunity, entrepreneurial process and entrepreneurial atmosphere, to improve the matching efficiency of the incubation resources and the management efficiency of the execution process.

5. Lowering the entry threshold of entrepreneurship, improving the recognition ability of entrepreneurs for entrepreneurial opportunities, and creating a low-risk entrepreneurial environment to enhance the confidence of external investors are a measure of incubation capacity of incubators, as well as the premise and foundation of improving incubating-efficiency of incubators.

6. Enough NE play a positive role in forming a stable internal incubation environment, promoting the interaction of entrepreneurial resources to build a complete incubation network and resource supply chain, and ultimately improving the incubating-efficiency.

According to the literature analysis and research in this section, Entrepreneurial Factors Analysis(EFA) is concluded in Table 2.5 1.

Table 2.5 1 Key Findings & Deduction from the EFA based on CPSED

P.L.E.A.		P.NEA.
Process link	*C.E.A.*	1st Collects information
① **Preliminary Plan**	Venture capital, business plan, team building, risk and opportunity analysis.	(industry, market, environment). 2nd Accumulation of funds for
② **Resource Input**	Fund input, site and equipment input, personnel	businesses. 3rd Financial risk analysis.

	input, product development, financing activities, patent/trademark/copyright application.	4th Business plan. 5th Partner and supplier contact each other. 6th Product development;
③ **Market Action**	Product testing, market research, marketing promotion, industry and industry analysis.	7th Resource input (hardware & software). 8th Market behavior (research, testing, promotion).
④ **Legalization**	To establish and register the organization.	9th Employee and legal person registration service. 10th External financing.

K.F.E.F.A.

Key Findings	*The Deduction*
The characteristics of entrepreneurship policies, entrepreneurs and entrepreneurial activities show the characteristics of regionalization.	In a big country like China, entrepreneurship research should be done regionally, not nationally. The integration of incubator resources should conform to the characteristics of regional economic development.
NE: Realize sales income within 6 months or more within one year after the establishment of a legal entity. Within a year, it has a profit of 6 months or more. The incubator can use this feature as a classification and evaluation standard for the incubation of an entrepreneurial organization.	Before the allocation of incubation resources, the primary task of an incubator is to identify the development stage of NE. The matching degree of resources between incubation resources and the stage of NE entrepreneurial activity is directly related to the overall incubating-efficiency of the incubator.

Relevant research shows that an incubator is a platform to integrate the information and resource exchange of various innovative and entrepreneurial resources in the region, and a policy tool and business infrastructure to drive the innovation and development of the whole region, and it must provide incubation services according to the characteristics of entrepreneurial activities. According to CPSED's research, in a specific external macro environment, entrepreneurship activities focus on the dimensions of entrepreneur, entrepreneurial opportunity, entrepreneurial process and entrepreneurial atmosphere.	The incubator can take the four dimensions of entrepreneur, entrepreneurial opportunity, entrepreneurial process and entrepreneurial atmosphere as the construction target of the incubation resource group, to improve the matching efficiency of the incubation resource and the management efficiency of the execution process. Lowering the entry threshold for entrepreneurship, improving the recognition ability of entrepreneurs for entrepreneurial resources, and creating a low-risk startup environment are important factors in judging whether an incubator can attract enough NE Enough NE play a positive role in forming a stable internal incubation environment, promoting the interaction of entrepreneurial resources and ultimately improving the incubating-efficiency. In the incubation process, the expectation of NE should also be raised.

P.L.E.A.: The Process link of Entrepreneurial Activities

C.E.A.: The context of Entrepreneurial activities

P.NEA.: The Priority of Nascent Entrepreneurial Activities （Top 10）

K.F.E.F.A.: Key findings in the Entrepreneurial Factors Analysis

➢ The data and conclusions are compiled according to the literature in this subsection as above.

H7：NE sales can reflect the level of incubating-efficiency.

H8：The stable cultivation environment of the incubator construction has a positive influence on the incubating-efficiency.

2.5.2 Review of incubating-efficiency

For a long time, the development of China's incubator industry has been led by the government, scientific research institutions and other public institutions. This shows the advantages of fast development of incubators, abundant space, good hardware facilities, low cost of acquiring social network resources and abundant auxiliary funds. However, with the development of the incubator, a series of problems such as the shortage of professional incubator management talents, low market participation, rigid management model, and the introduction of NE but little attention to process management and incubating-efficiency are also prominent. After 2000, more and more private capital participated in the construction of the incubator. By relying on their own industry background and making full use of their professional operation knowledge, these incubators with marketable operations have significantly improved the incubating-efficiency and promoted the public funded incubators to participate in the competition (Shiye Wang & Changqi Wu & Li Zhang, 2015).The government also recognizes that opening the incubator industry and increasing market competition is the cornerstone of the incubator industry transformation and upgrading and the only way to improve the incubating-efficiency.

Overview of incubator-incubation

In recent years, the research mainly focuses on the business model and management performance of the incubator. How to optimize the incubating-efficiency of the incubator for NE through resource allocation and path design is the core problem to be solved in these researches. McAdam proposed that the incubator can reduce costs and improve organization operation efficiency for NE by providing public infrastructure, network services and property services (McAdam & McAdam, 2008). The original need for incubation comes from the need for NE growth. Martin et al. believed that small scale, lack of growth resources, lack of professional management talent and lack of market access threaten the survival of NE in the initial stage. Incubators should help NE gain low-cost access to resources and grow quickly (Ruef, Aldrich, & Carter, 2003). The acquisition of low-cost and high-quality incubation

resources is an important sign that reflects the incubation capacity of the incubator, and the degree of utilization of resources also reflects the incubating-efficiency. At present, researchers who focus on the incubator incubation field mainly include Gema albort-morant, Domingo Ribeiro-Soriano, Sean m.ackett, David M.D.,Smilor r. w., Gill m. d. Mian, Allen D.N., Brooks O.J., et al., Ge Baoshan, Nie Ming, He Jinsheng, Wan Junkang, Wu Guisheng, Hu Shuhua, Zhao Liming, Mei Shue, et al. Scholars argue that there is a lot of waste in public incubators that rely on financial support. Bearse points out that most incubators that rely on public finance are not competitive or efficient. Campbell et al. believed that although the research on the incubating-efficiency of non-profit incubators was of little value, it had certain reference significance for the understanding of the incubator's incubating-efficiency. It is also pointed out that when studying the incubating-efficiency of incubators, they should choose incubators operating in or close to the market environment (Campbell & Allen, 1987) (Campbell & Allen, 1987)(Udell, 1990)(Theodorakopoulos et al., 2014)(Hackett & Dilts, 2004a)(Peter Bearse, 2014). Wang Shiye et al., from the perspective of organizational ecology, studied the mutual relationship and incubation effect of different population incubators. The relationship between organizations is mainly manifested as mutual benefit and competition. Under the positive influence of each other, there exists a symbiotic relationship, which can promote the establishment, growth and performance of both parties. On the contrary, under the negative influence, it is a competitive relationship, which is mainly manifested as inhibiting the development of the other party. According to the theory of organizational ecology, the incubator can be divided into two groups: enterprise group and quasi-government group. Through the effect of "legalization transmission", Wang et al. indicated that the distinction of incubator categories was mainly based on the degree of overlap in identity space and resource space, or the type of relationship between incubator organizations could be judged according to the degree of overlap. Similar or identical input elements and development resources exist among the same type of incubator organizations, including policies, markets, funds and so on. In order to grab limited incubation resources, homogenization competition is the most intense(Shiye Wang & Changqi Wu & Li Zhang, 2015). At the same time, any new organization is faced with the urgent need of obtaining legitimacy at the initial stage of production, and the overlapping of identities enables the transfer

of legitimacy between populations. It has been found that the similarity with the organization which has been widely accepted is an important channel for the new organization to gain legitimacy, which greatly accelerates the growth of the NE. As the scale continues to expand, existing organizations will occupy more resources. In order to protect their own development needs and avoid too many new organizations crowding out living space, existing organizations will actively set the threshold to inhibit the proliferation of the latter(Ruef, 2000)(J. Li, Yang, & Yue, 2007). In addition, public sector-led incubators, if they do not undergo the transformation of market operation, the government will not formulate normative regulations to give "MFN[13]"to all types of incubators in the region. In addition to the low operating efficiency of the original incubator, it will also, while consuming a large amount of resources, prevent the entry of other high-quality NE, make the incubator in the region produce reverse elimination, and finally maintain the low incubating-efficiency in the region. It is assumed that under the condition of constant short-term resources, the incubating-efficiency of an incubator is the key ability to plunder resources. It is the high incubating-efficiency, the stronger ability to acquire resources, and the lower cost of acquiring resources. Meanwhile, the lower cost of resources acquisition, the richer incubation resources, and the higher the incubating-efficiency for NE. The research also shows that the exchange of resources between the same types of incubator will be easier and more frequent, but the flow of resources between different types of incubators will be more meaningful to improve the incubating-efficiency of the incubator.

From the research of Wang et al., it can be concluded that the competition between incubators of the same type will reduce each other's incubation elements, or duplicate the construction of incubation resources, and cause internal consumption, thus reducing the overall incubating-efficiency of the incubator. There must be an outside force to break the unfair access to resources of different types, giving every type of incubator the same access to resources and funding opportunities. Studies have shown that incubation mainly refers to the allocation of resources needed by the incubator for the growth of new enterprises. The resources here refer to the products of the incubator, namely the services and support provided by the incubator. Therefore, the incubation

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13 MFN: Most-favored-nation-treatment.

research of the incubator can also start from the incubator products. Currently, incubators offer a wide range of incubation resources from content to form. Different researchers analyzed it from different perspectives, which basically involved the development stage of NE, the type of incubation resources, the application path of incubation resources, and the influencing factors of incubation efficiency. Wang Hongwei proposed that the incubator products mainly influence the performance of NE from three dimensions, to reflect the value of incubator and the incubating-efficiency. The three dimensions mentioned are foundation and business services, cultivation and environment services, and network and policy services. The research also summarizes that the incubation factors of the five categories of entrepreneur, industry structure, strategy, resources and organizational structure will have an impact on the performance of NE. The incubator service will first affect the performance impact factors of the enterprise, and the performance impact factors of the enterprise will then act on the NE performance. The impact of incubator services on enterprise performance has a direct and indirect impact, and mainly indirect impact(Hongwei Wang, 2008). Figure 2.5 1 shows the path of impact of incubator service on NE performance obtained by Wang's research.
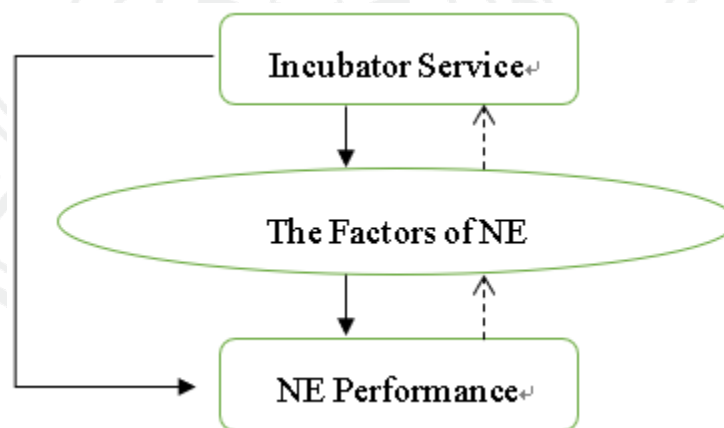
Figure 2.5 1 Route of the Impact of Incubator Service on NE Performance

In recent years, China has accumulated a lot of evaluation theories and methods on the efficiency of incubator. Some scholars believe that the incubation resource construction of the incubator should be analyzed from the perspective of new enterprise

demand, and the incubation capacity should be analyzed and evaluated by FCE[14] or AHP. There are also studies on the performance and incubating-efficiency of the incubator by combining the effectiveness of the internal operation of the incubator, the integration ability of social resources and the external loop (Xiyu Cao, 2001)(Bu Li, 2003)(Min Liang, 2004). Moreover, some scholars proposed to analyze the six elements of capital, technology, management level, system, organizational structure and information. And from the NE selection, NE cultivation and NE graduation process analysis. The core resources of the incubator are classified into four categories: tangible assets, intangible assets, incubation capacity and organizational capacity, and the performance and efficiency of the incubator is explored from these four categories of core resources(Hengguang Li, 2007)(Heyin Hou & Fangfang Ge, 2010).

It can be concluded from the existing research that the lack of incubation resources is mainly reflected in capital, talent and policies. According to the results of literature sorting, it is shown in Table 2.5 2.

Table 2.5 2 Shortage of Incubation Resources

Shortage of incubation resources	Incubator Service Type
Entrepreneurship training	The Basic
Financial support	
Policy and tax support	The policy
Industry guidance	The nurturing
Team building guidance	
Brand and market support	The environment
Industrial alliances and collaborative networks	

According to the literature, the incubating-efficiency of the incubator can be finally demonstrated by the input resources and the growth performance of the NE. From the incubation resources provided by the incubator, from the initial basic services to the full participation today, the incubator and NE are more closely integrated. This

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14 FCE: Fuzzy comprehensive evaluation method

combination is more of operation, capital, market and technology. The growth of NE is not linear, and the incubator needs to complete its orientation of cultivation stage according to the growth stage of NE. Cultivating NE in different stages can make the supply of resources needed for each stage of incubation more centralized, large-scale and professional. This model of incubation resource supply will make the incubator reduce the time cost and operation cost when acquiring the incubation resource. It will also make it easier for an incubator to transform from a single incubator to a network platform organization and make the incubation resources provided by the incubators within the network more professional and timelier for the development stages of NE.

The conclusions are as follows：

a) The marketization operation of the incubator is a prerequisite for studying the incubation efficiency.

Encourage the introduction of market-based competition mechanisms.

b) The core incubation resource supply capacity has an impact on the performance of new enterprises.

The resource supply ability is reflected in: The comprehensive quality of the entrepreneur; Ability to assist in developing enterprise strategy; Periodical hatching resource supply and matching ability; Industrial cluster and market network construction ability; Degree education resource supply ability; Commercial capability design capability.

c) The construction of incubator resources by category will affect the incubating-efficiency.

It can optimize resource allocation and improve incubating-efficiency by building five resource categories: infrastructure, business services, incubation network and cultivation, environment and policy, development and market.

d) The high-level consulting services provided by the incubator to assist NE in strategic management will have a direct impact on the incubating-efficiency.

Since NE cannot develop development strategies and conduct performance management, the incubator needs to provide advanced consulting training and participate in the development planning of enterprises.

e) The sharing of incubation resources and networking construction are helpful to improve incubating-efficiency.

Single incubator, to strengthen the construction of the incubation network can make hatch resource intensive, resource exchange and collaborative lower cost, better incubation is easier to form the whole industry chain, industry talent and the interaction of the new technology more economy, supporting policies and Suggestions for more directly and matching, new product market of lower cost, and the combination of the regional economy more closely, the NE growth space more sufficient, the business financial efficiency is higher.

From the research on the efficiency of Chinese incubator, there are some deficiencies. Firstly, it does not pay attention to environmental variables and lacks a general analysis of the operational performance of the incubator and its action mechanism. Secondly, the incubator research mainly focuses on the incubation of high-tech industries and enterprises, which does not have the universal value of the incubator operation and management. Thirdly, incubation is not regarded as an organic system whole, and there is no systematic theory explanation and analysis of incubating-efficiency. Finally, the research on incubators mainly focuses on the performance assessment of financial indicators, and the research on the incubating-efficiency is still lacking in both quality and specific areas.

Overview of incubating-efficiency

The understanding of incubating-efficiency needs to start from the efficiency itself, mainly borrowing the concept of efficiency in economics. In economics, efficiency means to maximize output on the basis of constant input of resources, or to minimize input under constant output (Jiao Zhang & Qun Yin, 2010). This study determined that the incubating-efficiency of the incubator reflected the comparative relationship between the input and output in the business activities and reflected the ability of the incubator to cultivate NE with the incubation resources. The research of incubator operation management and performance is the research of incubator incubating-efficiency.

There are mainly research methods and Chinese scholars on the incubating-efficiency of incubators: Zhang Lijian et al. constructed the efficiency index of the incubator through AHP and conducted empirical research and verification by using this indicator system (Lijian Zhang & Rongjuan Zhang & Le Cheng, 2006). Li Hengguang et al. used 3C system analysis framework, variation coefficient method and grey theory

to study the incubator performance (Wang, Gao, & Wu, 2011)(Kai Sun & Xiaofeng Ju & Yuhua Li, 2007)(Ninghui Liu & Xiaomin Wang, 2007). Liu Yanli used principal component analysis (PCA) to carry out empirical research under the framework of performance evaluation index system of business incubator (Yanli Liu, 2011)；Yin Qun el at. The DEA method was used to study the incubator efficiency improvement scheme, technical efficiency and its influencing factors (Qun Yin & Jiao Zhang, 2010)(Jin Wang & Keyi Wang, 2012). The study of Niu Yuying & Xiao Jianhua focuses on quantity rather than quality, direct output rather than indirect output, and studies the construction of incubator evaluation index system from the perspective of intellectual capital (Yuying Niu & Jianhua Xiao, 2013). Liu Shuai et al. studied the existing problems of the incubator in depth by using two methods of measuring shadow price of resource input and clustering analysis (Hui Zhang, 2016a) (Liu, Li, & Zhao, 2014).In terms of incubating-efficiency, PCA, factor analysis and AHP are also mainstream methods. For example, Liang Min analyzed the difference of incubator performance in different regions by using AHP in terms of basic service conditions, comprehensive service functions and incubation economic functions. It is concluded that capital is the key factor in the efficiency and performance of incubator (Min Liang, 2004). In the incubator performance indicator system constructed by Chan & Theresa and the incubation efficiency is measured, the resource endowment conditions, network advantages, funding subsidy capacity, market capacity characteristics and public image are taken into account comprehensively (Chan & Lau, 2005). Lingjuan Xu believes that non-profit incubators take political and social factors into account. The evaluation system was constructed based on political performance, service performance, process performance and economic performance, and the difference of incubating-efficiency was analyzed by PCA(Lingjuan Xu, 2011). As for the research on the incubation efficiency, this paper will analyze the research methods, the construction and network of incubation resources, entrepreneurship finance and the impact of the incubating-environment on the efficiency.

As a field of management and economics, efficiency study has many research methods and develops rapidly, among which DEA is the most popular in recent years. Sun Dahai et al. investigated the incubating-efficiency through the relation between the input and output of the incubator and evaluated the incubating-efficiency. This is the

first application of DEA to research on incubating-efficiency of Chinese incubator (Dahai Sun, 2005). DEA is a multidisciplinary linear programming method, which estimates the effective production frontier based on a set of observations on input and output and evaluates the relative efficiency. The model can be divided into input-based Efficiency and output-based Efficiency. Input-based Efficiency measures the proportion of factor Input reduction when Output remains unchanged; Output-based Efficiency measures the proportion of Output increase with unchanged input. The model can be divided into two basic models: CCR and BCC from the perspective of whether a variable return to scale. The CCR model is analyzed from the input side, and the production technology of each DMU is assumed to be fixed-scale remuneration. The linear frontier boundary is used to measure the efficiency frontier boundary and measure the relative efficiency of each decision unit. In 1984, the improved scheme of the CCR model proposed by Charnes et al. added the convexity hypothesis based on the original model and formed the BCC model. Thus the technical efficiency is decomposed into two parts: pure technical efficiency and scale efficiency(Banker, Charnes, & Cooper, 1984) (Jiao Zhang & Qun Yin, 2010). Zhang Jiao & Yin Qun proposed in the analysis of incubator efficiency in BCC model: The incubation efficiency can be divided into TE[15], that is, the maximum output that the existing input combination can bring. When the TE value is 1, the production technology of the decision-making unit is in the best state, and if the TE value is less than 1, the technical inefficiency is indicated. PTE[16] is about to withdraw from the influence of scale factors and analyze the allocation of resources under fixed scale returns. Measure whether the incubator is engaged in production with minimum cost in the short term. SE[17] refers to the ratio of resources input to output. The scale efficiency value of 1 indicates that the incubator reaches the optimal scale level, and the resource input and output of the incubator increase in proportion. The scale efficiency value of less than 1 represents no scale efficiency, and input-output increases disproportionately. It is the relationship between the three factors: TE＝PTE×SE. If the value of pure technical efficiency is

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15 TE: Technical Efficiency

16 PTE: Pure Technical Efficiency

17 SE: Scale Efficiency

greater than that of scale efficiency, it shows that the inefficiency of incubator operation is caused by scale inefficiency to a greater extent; if the value of scale efficiency is greater than that of pure technical efficiency, it shows that the main reason for the inefficiency of incubator efficiency is the inefficiency of resource allocation, serious input redundancy or insufficient output(Jiao Zhang & Qun Yin, 2010). To adapt to the application of different scenarios, DEA's improved models are more and more. For example, some scholars have introduced virtual decision making units to correct the defects of DEA's original model DMU(Ke, Wu, Wang, & Zou, 2018). From the perspective of the method itself, DEA is welcomed mainly for the following reasons: Incubator as a complex system, and the different resources of different types of incubation area involved. Under the constraints of real conditions, it is impossible to set a clear and uniform production and efficiency function, and the DEA method is suitable for the study of efficiency problems under such conditions. When evaluating the weight of the index system, DEA is not affected by subjective factors and is the optimal weight calculated by the actual data of the decision-making unit. The selection of input-output indicators is an important factor affecting the measure results of DEA methods, so the selection of index and model selection are very important. Due to the variable size of the incubator, Lovell et al. suggested using a variable BCC model for scale evaluation when evaluating the performance of the incubator. In order to further distinguish and compare multiple effective decision units which cannot be effectively differentiated under the framework of DEA model, super efficiency model is introduced (Knox Lovell & Pastor, 1999)(Jianqing Zhang & Mengxuan Sun & Fei Fan, 2017).The efficiency of incubator resource allocation reflects the ability of the incubator to use and integrate resources comprehensively, and its efficiency value can directly affect the incubating-efficiency.

In view of the characteristics of most N.E. (new enterprises) in China as high-tech start-ups, some scholars have improved the traditional analysis methods in recent years. Yin Weihua & Yuan Wei believed that the R&D activities should be divided into scientific research and development process and economic transformation process, and the time lag effect between scientific research input and output should be taken into account, and then the association network DEA method should be designed (Yin & Yuan, 2012). Feng Feng divided the whole research and development process into R&D

and application improvement and conducted empirical analysis by using the chain network DEA (Feng, Zhang, Gao, & Ma, 2011). Xinxiang Shi proposed that from resource input to scientific research output is only an intermediate product, and the final output needs to undergo the baptism of the market link. He adopted SFA for empirical analysis (Shi & Lu, 2010). In research on the impact of resource allocation efficiency factors, Li Shizhu using regression analysis, the configuration of scientific and technological resources from both structural and social environment indicators selected (Shizhu Li & Dongmei Li & Wuxiang Tang, 2003). Meng Weidong and others adopted the DEA-Tobit method to first measure the resource allocation efficiency, and then analyze the degree and direction of the influence of each external influence factor on the DMU. The main external factors are regional openness, regional economic level, higher education, natural capital, investment in education and technology, etc. (Weidong Meng & Qing Wang, 2013)(Hui Zhu & Weizhong Fu & Yanhua Liu, 2013). Further, the measure method using the DEA efficiency essentially determines the validity of DMU is valid. The classic model for the validity of the DMU is shown in Figure 2.5 2.
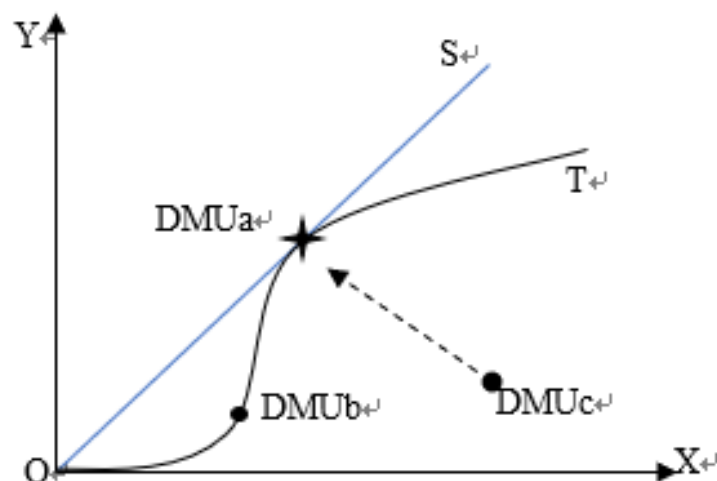
Figure 2.5 2 The DEA efficiency of economic operation
Source:(Hui Zhu & Weizhong Fu & Yanhua Liu, 2013)

OT line represents a Production function. OS line represents the effective production frontiers. DMUa is on the OT and OS, so DMUa is not only in scale efficiency but also in technical efficiency; DMUb is on the OS but is not on OT. DMUb is a weakly efficient DMU. DMUc is not on the OS and OT, so DMUc is non-efficient DMU.

The impact of entrepreneurial finance on incubation efficiency

From the perspective of investors, entrepreneurial finance is an important carrier for its wealth growth, but there is a greater risk in the investment of entrepreneurial activities. Richard(Rogers, 2009) Studies suggest that entrepreneurial finance refers to financing decisions entrepreneurs. From a portfolio perspective, the cost of capital does not depend on the overall project risk but is determined by the non-distributable risk of the project. The premise of this conclusion is that investors can spread risk at low cost. Most investors believe that good ideas are not difficult to find, but it is difficult to find a way to invest in effective projects. Therefore, VC is in urgent need of a third-party platform with credit screening capabilities to reduce the risk of investment. From the perspective of the development of NE, the support of funds is self-evident for the growth of NE and is the basis for the collection of many entrepreneurial resources. From the perspective of incubator, entrepreneurship finance is an important incubator resource. External financial resources can be called as incubation financial resources after being internalized by the incubator. The content of incubation financial resource service includes the matching of investment institutions to find investment projects, the matching of development financing of new enterprises, the matching of seed fund of new enterprises or start-up teams, scientific and technological product research and development and marketization capital subsidy, and the merger and investment service of NE.

In the traditional model of entrepreneurial finance, both parties negotiate directly, but the negotiation cycle of cooperation is long, and the transaction cost is high. However, compared with the involvement of the incubator as a third party into venture finance, the efficiency of completing investment and financing is generally improved. At present, the construction of entrepreneurial financial resources has become an important work in the operation of incubators and a core factor that directly affects the efficiency of incubation. It is important for the incubator to play the role of matching

and supervision of funds and projects, provide a fair and stable implementation environment for venture investment activities, and be an ideal resource interaction intermediary. Entrepreneurial finance has the following characteristics:

a) The separation of investment and financing decisions.

b) External investors participate in the management and supervision of NE.

c) The founder is the core asset of the new enterprise and an important object of investment.

d) The value of the NE is different from each other because of their different perceptions of risk. The equity allocation of both parties determines the investment value of the NE.

e) External investors focus on the growth of NE and their corresponding returns. This requires the entrepreneur or NE to prepare a complete and clear business plan.

f) Both parties shall design reasonable incentive agreements and investment and financing contracts.

g) The option value is the core value of the NE.

h) The largest return on investment of new enterprises lies in the liquidity generated by assets, mainly in the ways of IPO, overall acquisition, and new investor entry. The liquidity prediction of NE is the main consideration of investors before investment.

As NE need professional financial planning, financial analysis and cash management services to obtain funds; Investors need effective supervision of capital, actual situation of investment objects and a fair and honest investment environment when making venture investment. The incubator needs to realize industrial guidance and technology marketization through the allocation of incubation funds and resources. While meeting the needs of both parties, the incubator accelerates the cultivation of NE and improves its incubating-efficiency. Therefore, the incubation financial services meet the needs of the development of the three parties and achieve a win-win situation through the service configuration of the incubator. There are three main practical modes of financial resource allocation in China: ①Investment model of "central government - local government - venture capital organization - start-up enterprise" (applicable to seed stage); Its advantage lies in the government capital is abundant, seed fund supports strength is bigger. ②The investment model of "local government - commercial bank -

university or research institute - venture investment enterprise – NE".③The investment mode of "central government - commercial bank – securities or insurance institutions - venture investment enterprise – NE". On the other hand, for the VC industry, the narrow financing channel is an important bottleneck affecting the development of both parties. Countries such as the United States have begun experimenting with bringing deep-pocketed institutions such as securities firms or insurance companies and pension funds into VC activities, broadening the sources of funding for NE development (Baoshan Ge & Ziyang Feng & Qingyan Han, 2013).

At present, the research in the field of entrepreneurial finance draws on the theory of financial investment. The theory based on EN and VC is relatively mature, which emphasizes how VC solves agency problems through formal institutional arrangements(Jaffe, Gephardt, & Courtemanche, 1990) (GOMPERS, 1995)(Amit, Glosten, & Muller, 1990). In practice, the VC investment mechanism organically combines supervision, incentives and risk sharing, thus alleviating the agency problem in venture capital. However, the low efficiency of venture investment due to information asymmetry, the principal-agent model alone cannot solve the purpose of adding value to new enterprises through capital during the growth process of new enterprises, and VC institutions can hardly have any substantial influence on the behavior of new enterprises(Wei Zhang & Yanfu Jiang & Yaogang Chen, 2002)(Wijbenga, Postma, & Stratling, 2007). Generally, VC's investment cycle for entrepreneurial projects is 3-7 years, which requires the establishment of a long-term stable relationship and regular communication mechanism. However, if the VC relies solely on the power to force NE's decisions and behaviors, there is no buffer zone. So, cooperation between the two may not be sustainable. In the growth process of NE, there are high uncertainties in technology, products, market and management. Such high uncertainty also leads to the incompleteness of VC investment contracts. It is also unrealistic that the cooperation between NE and VC is completely subject to negotiation contracts. Some scholars specially studied the relationship of trust between investors and investors. According to research such as Sapienza, frequent and adequate communication can enhance both parties' information and improve investment efficiency. According to Social Justice Theory, both parties perceive that fairness is conducive to the establishment of trust. But it is difficult for both sides to perceive

fairness through direct dialogue (Sapienza, 1992) (Sapienza & Korsgaard, 1996)(Yanfu Jiang & Wei Zhang, 2010). In addition, empirical studies have found that the fairness between VC and NE is positively correlated with NE performance, while the performance of NE is directly related to the incubating-efficiency. As for the relationship between investment and financing between investment institutions and NE, some scholars put forward that it should pay attention to two aspects, namely ①From the perspective of new enterprise, it carries out research.②Based on the characteristics of the development stage of NE, this paper studies the formation and evolution of multi-party cooperation mechanism and its influence on the performance of NE, so as to influence the incubating-efficiency of the incubator (Yanfu Jiang & Wei Zhang, 2010).

According to the above analysis and synopsis, the incubator can carry out the incubation financial services based on the agent mode, to solve the capital problem in the cultivation of NE and obtain the necessary profits. For VC, participating in this partnership can reduce the selection cost of project investment, improve the perception of investment trust, and make investment more efficient. For new businesses, access to funding from inside the incubator is cheaper and more stable. From the perspective of the effect of cultivating NE, the overall incubating-efficiency of the incubator will be optimized and improved through such symbiotic cooperation. It can be said that the efficiency of the use of entrepreneurial financial resources reflects the incubating-efficiency of the incubator.

Effect of incubating-network on incubating-efficiency

More and more researches show that network cooperation is of great significance for the incubator to improve the incubating-efficiency. Hite pointed out that network plays a key role in the survival and growth of NE from the perspective of relationship and the theory of resource basis. Entrepreneurial network is an important way to acquire resources (Hite, 2005). Entrepreneurial network relationship refers to the relationship established by all participants of entrepreneurial activities (Peng & Luo, 2000). Such interconnections form different degree of networks, from links between organizations to links between resources. For the development of NE, the network connecting the incubation resources is more valuable, which is also the practical demand for the incubator to integrate into the entrepreneurial network. The establishment of network relationship is usually based on business connection and policy (Wu, 2011).The

network relationship under business connection can enhance the trust between organizations. The most important contribution is to bring "scale economy effect" to the organization.(Jun Wu & Jianzhong Xia, 2012)(Li Cai & Miaomiao Yin, 2008).In the real society, the network relationship environment is complex and dynamic. The dynamic environment is mainly caused by the diversity of market demand, the speediness of technology iteration and the instability of policy implementation. The dynamic environment will make it difficult for NE to predict the future development trend of the market and increase the cost of starting a business (Kovach, Hora, Manikas, & Patel, 2015). In general, network relationship becomes the resource base needed for enterprise growth and improves enterprise performance (Danis, De Clercq, & Petricevic, 2011). Wang Guohong et al. used TRM to study the formation path of the incubation network, and defined the four stages of the formation of the network, as well as the incubation focus and target of each stage, and drew the network generation path planning diagram (Guohong Wang & Huijing Wang & Rui Xing, 2014). According to Wang Hongwei, the network and policy service of the incubator is to establish a network of cooperation and development for NE, which is to integrate the resources inside and outside the incubator. The participants are incubators, NE and third-party institutions. He proposed that the incubation network constructed by the incubator mainly provides information and resources for NE. The direct role of network includes venture capital, business information and angel investment. Indirect effects include entrepreneurial atmosphere, preferential policy information and spillover effect of technology (Hongwei Wang, 2008). Su Jinqin et al. started with the research on the formation mechanism of the incubation network and its impact on the performance of NE, and proposed the impact of the incubation network on the incubating-efficiency (Jinqin Su & Ying Zhou & Yong Hong, 2011)(Haiqing Hu & Baojiang Zhang & Daohong Zhang, 2013).

In the Chinese context, the effectiveness of entrepreneurial networks depends more on the implementation of adaptive governance mechanisms. The implementation of the governance mechanism helps NE to reduce the cost of partner search, improve the efficiency of resource allocation and better accomplish the complex collaborative tasks (Larson & Starr, 1993). Governance mechanism is rich in connotation, the most typical of which is learning mechanism, contract and trust mechanism. The learning

mechanism will have a positive impact on NE performance, and the relationship strength can positively adjust the relationship between learning mechanism and NE performance. The application of learning mechanism to manage the relationship between NE and trading partners in the entrepreneurial network can promote the performance improvement of NE. Further, learning mechanism can better promote NE to acquire resources by using transaction relationship, making learning mechanism an important component of entrepreneurial network governance mechanism. However, the independent role of contract and trust mechanism does not help NE performance. Compared with mature enterprises, NE rely more on the founder's social capital or previous relationships to purposefully contact trading partners. It contains the emotion, reciprocity and commitment between the relationship subject and the entrepreneur, which constitute the main means to maintain the relationship in the early governance process of the entrepreneurial network. The low legitimacy of NE makes trading partners highly evaluate the opportunistic behavior of NE, and NE has no ability to undertake the opportunistic behavior of trading partners. This means that NE may not be able to rely on market-based contractual mechanisms to govern network relationships, as mature companies do. As new businesses grow, the relationship between new businesses and trading partners cannot always depend on entrepreneurs to maintain. The entrepreneurial network must realize the transformation from the entrepreneur's personal network to the inter-enterprise network, which means that trust based on the entrepreneur's personal relationship may not be applicable to the enterprise-level relationship, and trust cannot be transmitted to the enterprise relationship through personal relationships. As Guo Chun & Jane research suggests, the entrepreneurial network of the NE is showing a trend of spreading from the core strong relationship circle to the peripheral relationship circle, which means that the trust function carried by the strong connection of entrepreneurs is decreasing, and the business market operation relationship is gradually becoming Network main body (C. Guo & Miller, 2010). The role of contract and trust mechanism is more manifested in a mixed interaction. There is no substitute relationship between contract and trust, but an integrated relationship that complements each other. In theory, this view responds to the integrated view of Gulati et al. (Gulati & Nickerson, 2008) on the complementary relationship between contract and trust rather than substitution. As the personal network

of entrepreneurs is often embedded in the NE relationship network, the trust foundation formed by the individual social capital of entrepreneurs can guarantee the implementation of the network trust mechanism, and then through the high-frequency and high-intensity interaction with NE as the subject, it can further promote the improvement of the trust mechanism. On the other hand, relying solely on trust mechanism will make NE fall into the personal network of entrepreneurs and fail to realize the transformation to corporate network. (Peng, 2003). The incubator should integrate the contract and trust mechanism as effectively as possible, to reduce the cost of the network relationship of NE. Others, the endorsement of the incubator can effectively enhance the trust level of NE, improve the ability of resource acquisition and improve the performance of NE. The NE may also be appropriate to expand the size of its network through the incubator. The incubator's ability to compensate for the gaps in capabilities, credit, and scale of NE can effectively improve the incubating-efficiency of the entire network. Due to the existence of "new enterprise defects", it is difficult to use the value network for growth and development. Therefore, the incubator should use its own resource advantages to provide linkage and guidance services for the incubator network, thereby enhancing the growth of NE(Wei Han & Hongzhi Xue, 2008). In general, entrepreneurial activities rely on the resources of new companies, and the growth of new companies is based on the supply of resources. Most of the NE has poor ability to access key resources. As a result, NE needs incubators to help them get the resources they need to grow. However, the resource acquisition capabilities exhibited by individual incubators vary greatly. Only through the incubator alliance to form an incubation network can enhance the overall resource acquisition capacity of the incubator, thereby greatly improving the incubating-efficiency of the NE.

For the public incubator, it is only involved in the construction of the local incubation network, which plays an auxiliary role in the whole value network construction process of the NE. Due to non-profit characteristics, incubators rarely actively provide NE with coordinated services for key incubation resources. Therefore, the profitable incubator of market-oriented operation is more efficient. The efficiency assumptions thus proposed are: There is a positive correlation between the incubator's ability to master key incubation resources and the incubating-efficiency of new enterprises. In other words, the stronger the incubator's ability to master key resources,

the higher the entrepreneurial incubating-efficiency; The degree of the incubator participating in the construction of new enterprise value network has a u-shaped relationship with the incubating-efficiency, that is, when the degree of participation is low, the incubating-efficiency is gradually improved with the degree of participation, but after reaching a certain degree of participation, the incubating-efficiency will gradually decline with the degree of participation(Gangli Liu & Qiangzhi Li, 2014).

The following inferences can be drawn from the above literature: ①The incubators of market operation are the most efficient at present, and their advantages lie in their high power and ability to acquire key resources. These incubators are run by entrepreneurs and professionals with a wealth of practical experience to embed NE into existing value networks. A professional management and service team is the core to improve the incubating-efficiency of NE.②Public incubators are at a disadvantage in terms of incubating-efficiency and lack of initiative to connect resources and integrate into the incubation network. Existing public incubators are more about providing basic services for NE. But relative policy resources and financial resources are enough. It will be Suitable for NE initial stage cultivation. ③Improving the integration ability of key resources and exploring flexible participation mechanism of incubation network are the direction and trend of the innovation of incubation organization in the future. Although various incubation organizations have different resource types, they tend to fuse and share under the market competition.

Effect of incubation resource construction methods on incubating-efficiency

The key to incubator operating costs is the cost of acquiring resources and information. With the development of the Internet and information technology, geographical and site restrictions have been broken, making the sharing and flow of incubation resources more convenient, and the cost of acquiring incubation resources has further declined. More and more incubators use network technology to achieve low-cost operations, further deriving virtual incubators (Hui Zhang, 2016b). Because of the characteristics of the virtual incubator and its advantages in incubating-efficiency, more and more attention has been paid. In the United States, where entrepreneurship is most developed, virtual incubators have begun to develop on a large scale. In 2012, the White House launched the "STARTUP AMERICA" initiative and directly promoted the Mott

Foundation to build a virtual incubator network for American community colleges. In July 2013, HOUSE BILL No. 1378 requested the corresponding association to assist IEDC[18] in establishing and managing an Internet-based virtual incubator pilot program. In China, where the incubator is the fastest growing, before 2005, scholars paid less attention to the virtualized operation of incubators. However, in recent years, incubator virtualization research has also received extensive attention from Chinese researchers. The primary goal of virtual incubator operation is to strengthen the construction of incubation network resources and enhance the cultivation efficiency of NE through network relationships. The empirical analysis shows that there is a strong positive correlation between the development of virtual incubators, network technologies and high-tech NE in the region. For regional industrial restructuring, economic development, and new enterprise cultivation, the network construction of incubators should be strengthened. Liu Xiaoying research pointed out that the virtual incubator has three incubation network structures, namely "central-satellite" mode, "equality subject" mode and "core-intermediary" mode(Xiaoying Liu, 2006). Wang Sufen et al. said that since the general incubator requires a large site area and the operating cost is too high, the incubator research should be developed toward virtualization. And the definition of virtual incubator is given, that is, the form of incubation based on the Internet through modern information exchange means. The virtual incubator mainly provides services such as incubation management, information service, project management, consulting services, technical services, intermediary services, talent training, cooperation and communication(Sufen Wang & Hongkui Yan & Yongmei Qin, 2010). By analyzing the cooperation mode between the virtual incubator and the venture capital investment institution, it shows that this kind of cooperation can effectively optimize the incubating-efficiency, and gives the three modes of cooperation: basic mode, free choice mode and information platform mode(Liming Zhao & Yujie Zhang, 2011). For the development of incubators, specialization services should be carried out around a certain professional technical field, and it should be developed towards the incubator group, featuring networking, virtualization and internationalization. Extend the entrepreneurial value chain and enhance the incubating-efficiency through industrial

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18 IEDC: The Indiana Economic Development Corporation

incubation, industrial upgrading and integration with regional and urban economies (Bo Lv, 2014b). The research on the virtualization and networked operation of incubators to improve the incubating-efficiency has a broad space.

Impact of incubator performance criteria on incubating-efficiency

In the study of incubating-efficiency, an effective performance measurement and evaluation system can promote the improvement of incubating-efficiency, and the simple evaluation of profit indicators does not help the improvement of incubating-efficiency(Lingjuan Xu & Ninghui Liu & Dong Li, 2009). Gerhard suggested that the 4E performance evaluation method of economy, efficiency, effect and fairness be adopted to help incubators improve their incubation efficiency (Speckbacher, 2003). K.F.Chan and Theresa Lau studied the efficiency of incubators by applying the organization theory and cluster theory, and put forward nine factors influencing the incubating-efficiency, such as resource aggregation advantage, resource sharing, consultation service, public image and network advantage (Chan & Lau, 2005). Li Leiting et al. indicate that the efficiency of an incubator consists of several dimensions, among which the cultivation of professional talents is an effective way to improve efficiency. The evaluation index system of "organization - environment - process - quality" talent incubating-efficiency based on s-fnn method is proposed to help professional talent cultivation (Zhenhuan Liu & Yongkui Shi, 2007)(Shengli Wang, 2007)(Leiting Li & Zongyi Zhang, 2012). Wang Hongwei pointed out that the incubator service plays a direct role in the influencing factors of enterprise performance and has a role in the influencing factors of NE performance. In order to improve the incubating-efficiency, the incubator should provide services and allocate resources around entrepreneurs, strategy formulation, and phased allocation of resources for NE, network environment construction, educational background education and skills training. At the same time, the research also shows that the service provided by the incubator is a path that influences the performance of NE, then influences the performance of NE, and finally influences the incubating-efficiency of the incubator. Therefore, the conclusion can be drawn that the incubating-efficiency can be improved by strengthening the service and product resource allocation of the incubator(Hongwei Wang, 2008). Xing Lei et al. believe that because environmental factors inside and outside the incubator will affect the difference of incubation performance, it is necessary to carry out the

research from the micro perspective of NE(Marlow & Mcadam, 2012). In the research of performance on the incubating-efficiency, although the perspectives and conclusions are different, they all emphasize a common view, that is, in the research, it is necessary to examine the interaction between the internal and external factors of NE and incubators, as well as the important influence of such interaction on enterprise performance and incubating-efficiency. This also reflects the importance of process and dynamic management for the improvement of incubating-efficiency.

EO impact on incubating-efficiency

In recent years, many researchers in the field of incubating-efficiency have conducted analyses around EO. Li Yao et al. believed that EO has a significant impact on improving incubating-efficiency and improving startup performance (X. Li, Yao, & Wang, 2010)(Hu, Zhang, & Niu, 2009). The significance of EO is that it reflects the ability of NE to make development plans and implement strategic plans, which has a very important impact on the innovative growth of NE and the synergy of incubator resource allocation (Covin, Green, & Slevin, 2006)(Stam & Elfring, 2008). Some researchers analyze network strategy, Corporate legitimacy, Market orientation, Characteristics of senior executives and other factors studied the mediating and regulating effects of the relationship between EO and performance (Covin et al., 2006)(X. Li et al., 2010)(Blesa & Ripolles, 2003)(Jianfeng Jia & Xinan Zhao & Xiufeng Yu & Guofeng Wang, 2013). Most of these researches focus on the intrinsic mechanism of performance by influencing certain innovative behaviors or abilities from EO (Zahra & Garvis, 2000)(Raikes, Taylor, & Field, 2009). The EO of the NE is an attribute feature owned by it. In the "EO-Performance" relationship study, EO is analyzed concept. Generally, the resource endowment of NE can be divided into two categories: technology driven, and market driven. According to the growth characteristics of NE, EO can be divided into two categories: creation type and discovery type. Therefore, the incubator should consider the classification of EO when matching incubation resources, so as to make efficient use of resources(Rui Xing & Guohong Wang, 2015). From the related research literature of EO, it can be known that the incubation environment constructed by the incubator is more conducive to the survival of NE. The incubator should help NE to adopt the EO strategy to improve their innovation performance. The incubator should make full use of the EO effect of the

public sector and other organizations on NE, and help NE share the entrepreneurial risks in a highly dynamic environment through the leverage effect of entrepreneurial finance, so as to enhance the willingness of NE to innovate; And should strengthen the resources of incubators in the construction of infrastructure, business support, innovative cooperation platforms and external exchange platforms, improve the supporting environment for incubation, and optimize the incubating-efficiency.

2.5.3 The relationship between efficiency and performance

The incubator, as a commercial infrastructure for business incubation, has its own attributes and is consistent with the general rules of business operations. Research incubators can start with their most essential operational management. The most typical management method of modern enterprise management is performance management, which is also the central topic of enterprise management.

In general, the company's priority is to pursue the best performance. Performance is the unity of benefit and efficiency. There are connections and differences between the two. When a company's return on investment is not as good as the bank's interest rate for savings over the same period, it is better to deposit the funds (occupied) into the bank. Benefits are the result of the conversion of resources used by enterprises. If value-added is realized, positive benefits, that is, profits, and negative benefits, that is, losses, are achieved. Therefore, a company must have benefits, otherwise it is wasting resources. A company must also be efficient. To make a company profitable or profitable, it should make its operations efficient. Efficiency means getting as much output as possible with as little investment as possible. Measuring the efficiency of resource use, such as time resource efficiency, can be reflected in the amount of work done in a unit of time, or the time spent on the same workload. The same thing is to do one thing. The efficiency is different, and there are differences in the creation of benefits. Sometimes the difference is very large. Therefore, improving labor productivity, improving operational efficiency, and improving resource allocation efficiency have always been the fundamental ways for enterprise management to reduce costs, increase output, and improve competitiveness. For managers, the organization of the implementation process should be completed as efficiently as possible. Because no process, no results, and no efficiency, no benefits. In a successful organization, high

efficiency and high benefit are complementary, while poor management is usually inefficient and low-benefit.

Efficiency in an organization refers to the relationship between input and output, that is, the output created by unit inputs. Efficiency measurement is generally taken as the reference index of performance management. Efficiency improvement and optimization are the premise and foundation of performance management. Overall, efficiency = result/cost; Performance = results/behavior.

For the incubation organization, work around efficiency to reduce operating costs and improve incubating-efficiency by simplifying management operations. The emphasis on efficiency is also the foundation and premise of performance management. Therefore, the incubating-efficiency concerned in this study can better reflect the core competitiveness of an incubator.

2.6   Overview of Incubators & Incubation in Zhejiang, PRC

Research Overview of Entrepreneurship & Incubators in Zhejiang, PRC

In June 2016, China's first incubator complex, GENESIS ARK, was officially settled in Ningbo, Zhejiang province, which also marks that Zhejiang province has been leading the nation in the construction of incubator. The incubator complex is similar to a comprehensive large supermarket, which gathers the main incubation resources at present, enabling NE to obtain the necessary entrepreneurial resources in one stop.

As early as 1990, the entrepreneurship center of Hangzhou high-tech zone, which was transformed into a state-owned enterprise, became the first technology enterprise incubator in Zhejiang province, which officially kicked off the development of the incubator in Zhejiang. With the implementation of the national strategy of innovation and entrepreneurship and the establishment of the science and technology business incubator association in Zhejiang province, the construction of the incubator in Zhejiang has been greatly promoted, and a variety of new incubator forms have emerged. At present, the incubator in Zhejiang Province has formed a pattern of joint development of various types of incubators such as the University Science Park, the Overseas Students Pioneer Park, the College Student Entrepreneurship Park, and the Professional Technology Incubator. The construction of incubators in Zhejiang Province began in Hangzhou and Ningbo, and the development trend of incubator

clusters was formed in the Hangzhou Bay area with abundant human resources. Wu et al. shows the results of the investigation of the Zhejiang incubator (Yao Wu & Shu Ge & Ranyang Huang, 2014): The registered capital of the new enterprise ranges from 100,000 yuan to 30 million CNY, with an average registered capital of 1.5 million CNY; Registration less 6 months of NE or unregistered micro enterprises (2,000,000) accounted for about 95% in incubating；The proportion of NE or entrepreneurial teams of less than 20 people is about 90%;Entrepreneurs have 5 to 10 years of work experience, and about 50% of those ages are 31-35 years old; Bachelor degree or above accounted for about 78%;The NE receives about 50% of the financing of 600,000 to 1.2 million (CNY), and the average government support fund is 220,000 CNY；Others, the survey also found that the average number of entrepreneurial training and consulting services for NE was only 7.2 times, and the training support capacity was rather weak. The incubator performs well in basic support services such as taxes, office space expenses, property, and finance. The NE has obtained a good external financing environment, government financial support and a convenient internal entrepreneurial environment through the incubator, which has greatly reduced the cost of starting a business. According to the research of the literature in this study, the incubator in Zhejiang should help the entrepreneurial team to improve the talent structure, improve the entry threshold of the NE, and strictly control the source, to lay a good foundation for the improvement of incubating-efficiency.

From the perspective of the operation mode of incubators in Zhejiang in recent years, they are mainly concentrated in four types: ① Entrepreneurial coffee; Emphasizes the creation of a business atmosphere, which helps NE accumulate certain network resources and brand benefits through activities. For NE, they can conduct business through flexible leasing stations, all expenses are settled monthly, and the funds that occupy too many new businesses are avoided to the greatest extent. The main market segments are young entrepreneurs or start-up teams. ②Industry incubator; emphasizes the professionalism of incubation resources and the linkage of industry chains. This type of incubator focuses on industry characteristics, providing professional angel investment, industry entrepreneurial tutors, upstream and downstream industry resource docking, industry information and entrepreneurship

counseling. The general incubation period is 18 months. ③ Incubator complex; emphasizes the integration of multi-party resources, and could manage government guidance funds, paying more attention to capital guidance and review of entrepreneurial projects. This type of incubator has a high concentration of resources, and has a wide range of radiation areas, and is supported by strong investment and financing resources, and is usually combined with commercial real estate. It is the core node of the entire incubation network and the typical infrastructure for regional entrepreneurship, often representing the highest level of development of a regional incubator. ④Characteristic towns; the formation of industrial agglomeration through industrial alliances, thus promoting the development of entrepreneurial activities. More emphasis is on the combination of talent, policy, industrial development, investment and financing. It is mainly based on government guidance and government financial investment and is an important place for the implementation of government industrial development plans. But the essence is the same as the industry incubator, and it has expanded in connotation.

Related Policy of Entrepreneurship and incubators Overview

According to the NBIA research report, for every POS[19] invested in the incubator, tax revenue of about $45 can be generated in one year. In terms of employment, incubators create an employment opportunity cost about 1/9 of non-incubator. It will also drive new jobs in the region, which is about half the number of jobs created by incubators. At present, to improve the incubator in the region and improve the incubator efficiency of the incubators, local governments have introduced various support policies to improve the overall operation of the incubator. Many scholars have pointed out in the beginning of the establishment of incubators; the government should actively intervene to give strong support to the smooth growth of the incubator. However, from the perspective of fair and long-term development of the incubator, the government should formulate relevant laws on the development of incubators, establish relevant regulations and regulations for management, and encourage the market operation of incubators. The government's management and support are law-abiding, evidence-based, and consistent and continuous. For incubators, the prerequisite for sustainable

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19 POS：Public Operating Subsidy

development and efficient incubation services is to fully understand and interpret relevant policies and regulations. Gong qin at el. said that the construction of the incubator is inseparable from the support and guidance of the government. It must first know the government's preferential policies for incubators and NE(Qin Gong & Qichuan Wu & Qi Jin, 2004). From the policy level, there are basic laws and guidelines for the relevant departments of the country, as well as local governments' policies and norms for regional economic development. As the competent authority of the incubator in China, MOST and its agencies are the departments that have the most guidance documents and standardized management documents and have become the basis for the development planning or standard management of incubators by various departments and local governments. To provide the normative ideas, objectives and construction measures for the development of the incubator in the new century. MOST issued the "Opinions on Accelerating the Construction and Development of High-tech Entrepreneurship Service Centers" in April 2000; In 2001, the development outline of China's technology business incubator during the tenth five-year plan and opinions on vigorously promoting the development of technology business incubator during the tenth five-year plan were released; In order to further improve the management level of incubators, MOST issued several opinions on further improving the operational quality of technology business incubators in 2003.

In recent years, the Zhejiang provincial government attaches great importance to the transformation and upgrading of traditional incubators and the innovative development. It hopes that the incubator can play an active role in promoting innovation and entrepreneurship, cultivating high-tech industries and enterprises, attracting social employment and the entrepreneurship of overseas high-level talents. To this situation, the local government issued a series of management and support policies. Two important instructive documents were issued in 2001: *The implementation opinions of Hangzhou municipal government on further promoting the construction and development of science and technology business incubators*, and *the implementation rules for the identification and assessment of science and technology business incubators in Hangzhou*. In addition, for the development of new enterprises in the incubator, several laws and regulations such as *Administrative measures of seed funding for scientific and technological entrepreneurship in Hangzhou* and *Administrative*

measures of development funds for pharmaceutical industry in Hangzhou have given policy support. The documents No. 42 and No. 43 published in 2003, namely *Opinions on the identification and implementation of technology business incubator in Zhejiang province* and *Measures for the use of funds for the construction of key technology business incubator in Zhejiang province*, were pointed out：The confirmed incubator will enjoy the preferential policies of provincial high-tech enterprises, and the NE in the incubator can also enjoy the free support of provincial incubator construction funds. In 2013, Zhejiang science and technology department promulgated the "implementation of innovation-driven development strategy"，And it came out one after another such as *Some opinions on further accelerating the construction of technology business incubator system*, *Public entrepreneurship and innovation service action plan*, *Some Suggestions on promoting "mass entrepreneurship and innovation" by promoting the use of innovation vouchers* and so on. And clearly put forward to further form the system mechanism that is beneficial to innovation and entrepreneurship. In August 2016, *the 13th five-year plan for scientific and technological innovation of Zhejiang province* was released to strengthen scientific guidance and future planning for regional incubator construction, vigorously support the construction of NE, and promote the opening and sharing of scientific and technological resources. It has laid a policy foundation for the incubator in Zhejiang to form regional incubation network, share incubation resources and improve incubation efficiency. After more than 20 years of development, hardware facilities and incubation service capacity of Zhejiang incubator have been significantly improved, which become the sources of promoting economic and social development in Zhejiang. By the end of 2016, the number of incubators cultivating new enterprises in Zhejiang has reached 55 (of which 22 are listed on the "new third board"). At the same time, there are many difficulties and deficiencies in the development of the incubator in Zhejiang, which is mainly reflected in the soft service capacity. For example, there is a serious shortage of professional incubator managers, and startup tutors are unable to meet the needs of further development of NE. Moreover, most of the incubators in Zhejiang are still in the stage of individual incubation, and there is no strong incubation network. The incubating-efficiency is relatively low, and there is a lack of certain competitiveness. In addition, the government still focuses its support on investment and merchant

attraction. The management thinking has not changed, nor has it fundamentally improved the business environment to guide the incubator to improve the incubating-efficiency. According to the policies and regulations related to incubator. Construction in Zhejiang region (2000-2016), the results is summarized as Table 2.6 1.

Table 2.6 1 Policy & Status of Entrepreneurship & Incubators in Zhejiang

Issue (Year)	Main contents (2000-2017) laws, regulations, guidance documents, support policies
2000	*Some opinions on accelerating the construction and development of Hi-Tech startup service center.*
2001	*Development program of China's science and technology business incubator during the tenth five-year plan period.*
2001	*Opinions on vigorously promoting the development of science and technology business incubator during the tenth five-year plan.*
2002	*Law of the People's Republic of China on the promotion of SMEs.*
2003	*Some opinions on further improving the operation quality of technology business incubator.*
2003	*Opinions on the identification and implementation of technology business incubator in Zhejiang province.*
2003	*Measures for the use of funds for the construction of key technology business incubators in Zhejiang province.*
2014	*Some opinions on accelerating the cultivation and development of small and micro S & T enterprises.*
2015	*Opinions of the people's government of Zhejiang province on vigorously promoting mass entrepreneurship and innovation.*
2015	*S&T Department of Zhejiang Province and Finance Department of Zhejiang Province, on the issuance of coupons to promote the application of innovation and promote several opinions "mass entrepreneurship and innovation" (Trial).*

	Implementation Opinions on Accelerating the Development of Marker Space to Promote Entrepreneurial Innovation.
2016	*Implementation measures for encouraging and supporting scientific research personnel in public institutions to leave their posts for entrepreneurship and innovation in Zhejiang province (trial).*
	Opinions of Zhejiang provincial committee of CPC and the people's government of Zhejiang Province on deepening reform of talent development system and mechanism and supporting talent entrepreneurship and innovation.
	Opinions of Zhejiang provincial department of S&T on giving play to the role of scientific and technological innovation in promoting the construction of Zhejiang special town.
2017	*Several opinions on further promoting the use of innovation vouchers to promote mass entrepreneurship and innovation;*
	Opinions of the people's government of Zhejiang province on promoting the sustainable and healthy development of venture capital investment.

Government support funds for the construction of business incubators in Zhejiang	
Amount/period	300 million Yuan (CNY) per year. One operation cycle in 5 years.
Subsidy object	The first round of supporting subsidies and performance appraisal awards.
The proportion of subsidy	First aid accounts for 25%. Performance appraisal bonus 20% not more than 45%.
Major supportive policies in the region	The profits from the transformation of new technologies and the taxes paid by NE were returned to the incubator in full for improving the incubation conditions. The new technology research, development and new production of the new enterprises in the incubator can be funded by the government for the construction of the incubator.

	The supporting funds account for 20% of the total amount of new product development of NE in key industries, and no more than 12% of NE in non-key industries.
	For the talents (mainly doctors) introduced by the incubator, policy support, such as household registration service, tax, housing, social insurance and living allowance will be given;
	Other government support policies focus on rent subsidies for office, production sites and equipment.
Business incubator construction existing problems in Zhejiang	
Spatial contradiction	Overall, there are plenty of incubators in the region, but the incubators are mainly in central cities, and the CBD area is crowded.
Strategic contradiction	The incubator focuses on attracting investment but ignores the cultivation of NE in the incubator. There is no gradient incubation between incubators.
Resource contradiction	The supporting policies of the government-dominated incubators are intensive, and the acquisition cost of various resources is low. However, the cost of acquiring resources is higher for non-government private incubators. Investment policy and resources, but NE incubation related resources are insufficient.
Type imbalances	There are many comprehensive incubators and there are few professional incubators closely related to the special industry.
Incubating-efficiency	Focus on the introduction of NE, lack of high-quality cultivation, the overall incubating-efficiency is low. The single incubator is the main one, which does not form the whole incubation network and the circulation of incubation resources.

2.7 Summary Analysis of Knowledge Graph about Incubator Research

In this paper, with the help of VOSviewer software, selected and analyzed 53,743 literatures related to incubator in Web of Science database by means of bibliometric map analysis. Based on the dimensions of incubator, incubation efficiency, new venture, performance, startup, entrepreneurship，time (2010-2017wos database literatures), hot countries and major research publications, the visualization results of VOSviewer clustering calculation are as follows：

1. Hot country distribution of incubator research

Figure 2.7 1 is the national distribution density clustering of the incubator study. It can be clearly seen from the figure that the core countries of the current incubator research are concentrated in the western industrial countries headed by the United States, the United Kingdom, and Germany. China has also become one of the major research countries and is a hot country in this field. The density clustering and research association network (Figure2.7 2 and Figure2.7 3) all reflect the incubation research in South Korea, Japan, Taiwan region of China, Thailand and other Asian countries and regions with the Chinese research process as the reference. Therefore, the research on Chinese incubator has strong social value.

Figure 2.7 1 Countries Distribution Density Visualization of Incubators Research
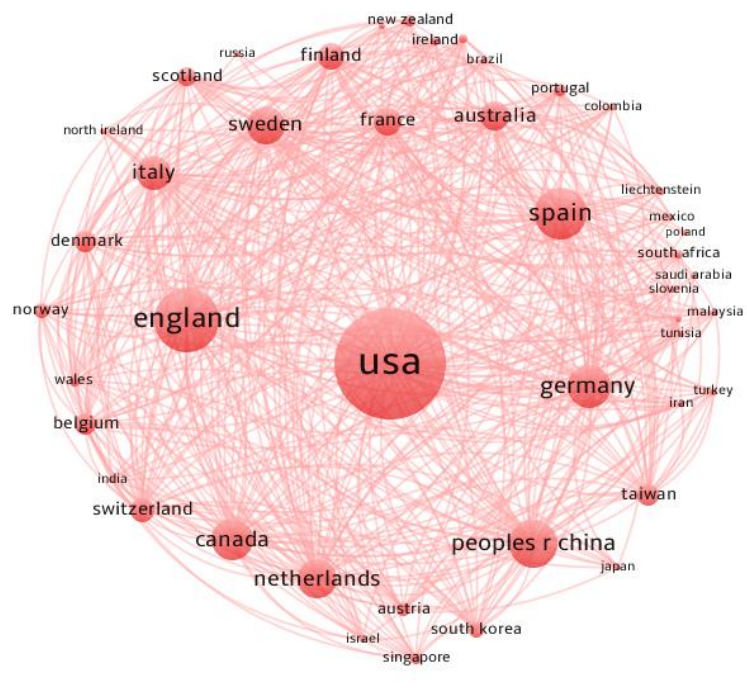
Figure 2.7 2 Network Visualization of Key Countries of Incubators Research

Figure 2.7 3 Key Countries Link Strength of Incubators Research

2. Publication window of research results

Figure2.7 4 is the published journal diagram of the incubator research paper. The graph is mainly based on the number of journal citations and the relationship to form a cluster. From the publication of articles related to incubator research, it focuses on Journal of Business Venturing, Entrepreneurship Theory and Practice, Journal of Technology Transfer, International Entrepreneurship and Management Journal, Small Business Economics et al. However, it did not appear in a large number of traditional top management journals（i.e. Academy of Management Annals，Academy of Management Journal），It indicates that the incubator research has been a relatively mature and independent professional field, rather than the initial stage. From the perspective of national distribution of periodical publishing, Chinese journals have not yet taken a place in the field of incubator research, which also reflects that the quality of Chinese incubator research is not high.

Figure 2.7 4 Key Journal Link Strength of Incubators Research

3. Status of the institute of incubating-efficiency

Figure2.7 5 is the density clustering of all research directions in the incubator research field. Figure 2.7 6 is the clustering of the relation network of each direction of the incubator research. It can be clearly seen from Figure2.7 5 & Figure2.7 6 that although the incubating-efficiency is not the hottest direction in the field of incubator research, it is at the center of incubator research. Compared with Figure2.7 7 (2000-2009), the incubation research is developing towards diversity, and the incubating-efficiency is gradually getting attention.

Figure 2.7 5 Density Visualization of Incubators Research orientations

Figure 2.7 6 Link Strength of Incubators Research orientations

Figure 2.7 7 Density Visualization of Incubators Research orientations

4. Research on incubating-efficiency

　　Figure2.7 8 is the relation network clustering of the influencing factors of incubating-efficiency. Figure2.7 9 is the density clustering of the influencing factors of incubating-efficiency.

Figure 2.7 8 Network Visualization of Factors of Incubator-efficiency
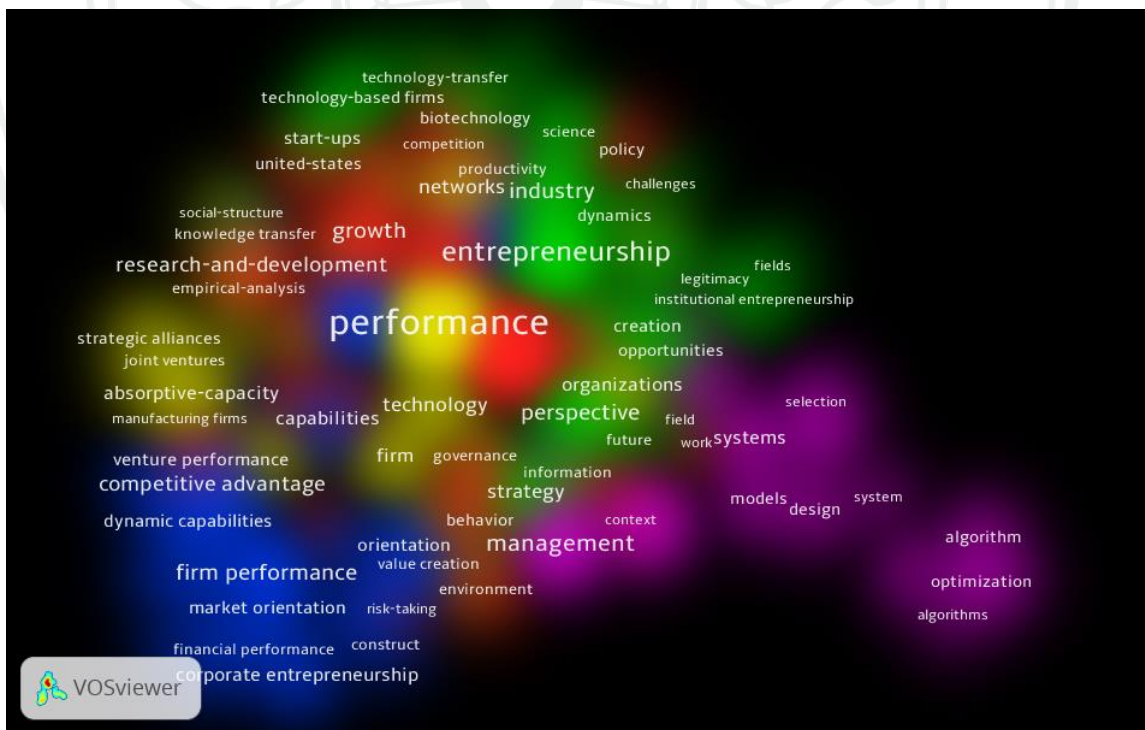
Figure 2.7 9 Density Visualization of Factors of Incubator-efficiency

To better analyze the correlation, the rendering of clustering graph is more accurate and intuitive. VOSviewer Normalization Method sets Association strength; Layout parameter is set to Attraction:2 and Repulsion:1; Lines: 200; Clustering parameter was set as Resolution:2 and Mi. Cluster size:5; Use the Merge small clusters. Figure2.7 10 is the re-calculated correlation network clustering of the influencing factors of incubating-efficiency. Figure2.7 11 is the density clustering of the re-calculated influencing factors of incubating-efficiency.

Figure 2.7 10 New Network Visualization of Factors of Incubator-efficiency

Figure 2.7 11 New Density Visualization of Factors of Incubator-efficiency

According to the VOS viewer's clustering calculation results, three aspects that have an impact on the incubating-efficiency can be obtained by sorting. The details are as follows：

1. Entrepreneurship dimensions: entrepreneurship behavior, entrepreneurship opportunity, entrepreneurship orientation, entrepreneurial value, NE structure, startup time, and so on;
2. Performance dimension: NE performance, market orientation, innovation orientation, process management, NE scale, and so on;
3. Development dimension: network relationship, strategy, new technology and intellectual support, innovation ability, government support and so on;

2.8 Chapter summary

The conclusions of this chapter are summarized according to the literature and related research.

This article literature summarizes

As for the research opinions of major researchers on incubating-efficiency, the government's evaluation standard of incubator efficiency and the insufficiency of incubator services are shown in Table2.8 1.

Table 2.8 1 The Summary of Research by Researchers, Government Standardized Evaluation of Incubation-efficiency & Main Service Function Weakness of Incubators as above Literature

Summary of Important research by Major Scholars as above Literature		
Sections	**Researchers**	**Main Viewpoints**
Entrepreneurship	P, Davidsson et.al (P, 2005) (Ge & Wang, 2017)	The important field of modern management study is interdisciplinary. The incubator operation is based on the entrepreneurial activity, and the incubating-efficiency is also based on the resource element allocation of the NE.
Incubator	Smilor R. W. et al. (Smilor & Gill, 1986) (Lalkaka, 2006) (Su & Yao, 2007) (Cooper, Hamel, & Connaughton, 2012)	Incubators should be supported by the government, relying on the help of universities and research institutes, and organizations with close ties to various organizations. An organization that utilizes its own resources to help entrepreneurs succeed. The incubator provides a platform for system collaboration and resource integration. It has a special role for the state, enterprises, venture capital and all sectors of society, and it plays a special role in stimulating entrepreneurship.
	Brooks et al. (Brooks, 1986) (Campbell & Allen,1987) (Udell, 1990) (Mian, 1994)	An incubator is an institution with many NE. The incubator uses abandoned buildings to provide centralized, cheap and flexible rental places for NE to conduct research, development and office work.

	(Adkins, 1996) (S.A., 1996) (Ming, 2004) (Anna & Charlotte, 2008) (WH & DN, 2010)	It also has incubation resources such as facility sharing, business support, policy and financing, professional management assistance, legal affairs and market.
	(Jianhua, 2011) (Wang, 2013)	An incubator is a mechanism for assisting and promoting business development, providing specialized technical services and other financial or advisory assistance.

An incubator is an organization that provides NE with Shared space, Shared support services, expert advice, business support, and network support.

The incubator is a platform specially set up for promoting the development of NE. The purpose of the platform is to help the entrepreneurs to get through the difficult period in the early stage of entrepreneurship and to help them to graduate and realize profits. |
| Mark et al. | (Mark, et al., 1995) (Sarfraz, 1996) (Jing, 1998) (Li, Zhang, & Chen, 2001) (Ding & Ling, 2003) (Hengguang, 2007) | The incubator acts as a distribution center, providing advice and guidance to entrepreneurs. It is a system space that provides services needed for survival and growth. It is a social service organization specialized in cultivating and fostering the development of NE. |
| Culp et al. | (Culp, 1996) (Cao, 2001) (Qiang, 2003) | The incubator is a new social and economic organization that implements the incubation mechanism and an innovative tool to promote |

(Jin, Li, & Liu, 2004) (Hong, 2009)	economic development. By providing a variety of intangible and tangible services and resources for NE, and participating in NE management and other aspects of support, it can greatly reduce the risk of new high-tech enterprises and improve the survival rate and success rate of NE.
Smllor et al. (Wang, 2013) (Wang, 2013) (Lai & Lin, 2015) (Mas-Verdú, Ribeiro-Soriano, & Roig-Tierno, 2015)	An incubator is not limited to the meaning of physical hardware, but also an innovation system to assist the development of NE, an innovation system designed for the development of high-tech enterprises, and an enterprise supporting institution. It provides the necessary start-up support for entrepreneurs and is a tool to accelerate their success. The mission of an incubator is mainly to inspire entrepreneurs, promote innovation and lead regional economic development.
Nicholas et.al (Nicholas, Nada, & Carmel, 2014) (Gema & Domingo, 2016)	The incubator research paper was first published in 1985. As the incubator theory has not been developed, it directly affects the research on the optimization of incubating-efficiency.
Hou Heyin et al. (Hou & Ge, 2010) (Roberto & Giuseppina, 2016) (Johan, Tiago, Bart, & Aard, 2012) (Li W., 2014) (Cui & Jiang, 2013)	The research on incubator sustainable development has typical interdisciplinary nature, which reflects the strong vitality of an organization. The key is to integrate government resources, NE resources and other intermediary service organization resources into the incubation network resources and develop in coordination with the incubator. From the perspective of American incubator development iteration, the first generation of incubators mainly provide infrastructure, while the second generation

		provides more comprehensive services such as training and consultation, and the third generation of incubators will pay more attention to network services.
		The incubator should pay attention to the regional situation in the selection process of NE and improve the incubating-efficiency through collaborative innovation of incubation network.
Incubation Efficiency & Performance	Campbell et al. (Campbell & Allen, 1987) (Udell, 1990) (Sean & David, 2004) (Maura & Rodney, 2008) (Peter, 2014)	The incubation research of the incubator began in 1984. The incubator provides public infrastructure, network services, and property services. The aim is to reduce the cost and improve the efficiency of the organization. The research value of the incubating-efficiency of non-profit incubators is not great.
	Martin et al. (Martin & Nancy, 2004)	In the initial stage, NE are faced with such problems as small scale, lack of growth resources, lack of professional management talents, and lack of ability to enter the market. The incubation of an incubator solves these problems. It is an important sign of incubation ability to let NE acquire growth resources at low cost.
	Martin et al. (Martin, 2000) (Li & Yue, 2007)	Any new organization faces the urgent need of legitimacy, and the overlapping of identities enables the transfer of legitimacy between populations. Similarity to the status of an organization that has gained wide acceptance is an important channel for the new organization to gain legitimacy. As the scale of the industry continues to expand, the

	industry will be increasingly scarce resources. Therefore, to avoid too many new organizations crowding out the living space, existing organizations will actively set the threshold to inhibit the proliferation of the latter.
	The effectiveness of internal operation, the integration ability of social resources and the external ring are combined to improve incubation efficiency and release resource space. It also expands the boundary of industry resources by building an incubation network.
Cao Xiyu et al. (Cao, 2001) (Li B., 2003) (Liang, 2004) (Li H., 2007) (Hou & Ge, 2010)	The effectiveness of the internal operation of the incubator, the integration ability of social resources and the external loop are combined to study the performance and incubating-efficiency of the incubator. There is also an analysis of six elements including capital, technology, management level, system, organizational structure and information. And from the selection of NE, NE cultivation and NE graduation process analysis. The core resources of the incubator are classified into four categories: tangible assets, intangible assets, incubation capacity and organizational capacity, and the performance and efficiency of the incubator is explored from these four categories of core resources.
Wang Hongwei (Wang H., 2008)	Incubators mainly influence the performance of NE from three dimensions, namely, basic and business services, cultivation and environmental services,

	network and policy services, so as to reflect the value and incubating-efficiency. In addition, the incubation elements of the five categories of entrepreneur, industry structure, strategy, resources and organizational structure will have an impact on the incubating-efficiency. And the effect is mostly indirect.
Wang Shiye et al. (Wang, Wu, & Zhang, 2015)	The theory of organizational ecology holds that the relationship between organizations is mainly manifested as mutual benefit and competition. According to the composition of the investors, the incubator can be divided into two groups: enterprise type and quasi-government type. Through the effect of "legalization transmission", the distinction of incubator categories is mainly based on the degree of overlap in identity space and resource space, or the type of relationship between the incubator organizations can be judged according to the degree of overlap. Similar requirements for the same type of incubation and development resources were found.
Zhang Jiao et al. (Zhang & Yin, 2010)	The research on incubating-efficiency mainly borrows from the concept of efficiency in economics. Efficiency refers to the maximum output of products and services based on constant input of resources, or the amount of resources input under constant output of products and services.
Chan, K.F et al. (Chan & Theresa, 2005) (Xu, 2011) (Niu & Xiao, 2013)	When the incubator performance indicator system is constructed, and the incubating-efficiency is measured, the resource endowment condition, network advantage, fund subsidy capacity, market

	capacity characteristics and public image are considered comprehensively. The construction of incubator evaluation index system is studied from the intellectual capital.
	The non-profit incubator constructed an evaluation system based on political performance, service performance, process performance and economic performance.
Zhang, Lijian et al. (Li, Li, & Tang, 2003) (Zhang, Zheng, & Cheng, 2006) (Li, Zhao, Gu, & Wang, 2007) (Sun, Ju, & Li, 2007) (Liu Y., 2011) (Liu & Qian, 2011) (Meng & Wang, 2013) (Zhu, Fu, & Liu, 2013) (Liu, Li, & Zhao, 2014)	In the research on incubator performance indicators and efficiency, the main methods adopted by scholars include AHP, 3C system analysis framework, variation coefficient method, grey theory, PCA, shadow price, cluster analysis, DEA-Tobit, SFA, regression analysis, etc.
	The research mainly starts from the aspects of service conditions, comprehensive service functions, incubation economic functions, and funds. Analysis of various external factors that influence the degree and direction of DMU.
	It is proposed that from the input of resources to the output of scientific research, it is only an intermediate product, and the final output needs to be baptized by the market link; and the indicators are selected from the two aspects of resource allocation structure and social environment.
Banker et al. (Banker, Charnes, & Cooper, 1984)	DEA is the main method for the study of incubating-efficiency. To adapt to the application of different scenarios, the improved model of DEA is

(C.A.Knox & Jesús, 1999) (Sun, 2005) (Zhang & Yin, 2010) (Yin & Zhang, 2010) (Wang & Wang, 2012) (Sun, Cao, & Bi, 2013) (Zhang, Sun, & Fan, 2017)	also more and more. In 1984, the improved scheme of CCR model proposed by Charnes et al. added the convexity hypothesis based on the original model to form the BCC model. The virtual DMU was introduced to correct the defects of the DEA original model DMU; to further distinguish and compare multiple effective DMU, introducing a super efficiency model.

In 2005, Sun Dahai investigated the incubating-efficiency through the input and output of the incubator and evaluated the incubating-efficiency. This is the first application of DEA in the study of incubator efficiency in China. |
| Feng Feng et al. (Feng, Zhang, Gao, & Ma, 2011) (Yin & Yuan, 2012) | The entire R&D process was divided into research and development and application improvement, and an empirical analysis was carried out using a chained network DEA. It is believed that R&D activities should be divided into technological R&D processes and economic transformation processes, and the time lag effect between research input and output should be considered. |
| Raphael et al. (PAUL, 1995) (Raphael, Lawrence, & Eitan, 1990) (Zhang, Jiang, & Chen, 2002) (Paul & Josh, 2006) (Frits, Theo, & Rebecca, 2007) (Jiang & | Entrepreneurial finance has a direct impact on the incubator's incubating-efficiency, and requires cooperation between the incubator, investment institutions and NE. Through the platform advantage of the incubator, the venture capital investment is more efficient, and the funds are safer; the NE financing is more convenient, and the cost is lower. |

Zhang, 2010) (Richard & Janet, 2011) (Ge, Feng, & Han, 2013)	The fairness cooperation between VC and EN is positively related to the performance of EN, and the performance of NE is directly related to the incubating-efficiency. At present, it is mainly based on the more mature EN and VC agent theory.
	In the practice of incubators, supervision, incentives and risk sharing are combined to alleviate the agency problem in venture capital.
	From the perspective of investment risk portfolio, the cost of capital does not depend on the overall project risk but is determined by the non-distributable risk of the project.
	In the United States and other countries, it has begun to try to introduce institutions with strong capital such as securities companies, insurance companies and pension funds into venture capital activities, and broaden the source of investment funds.
Mike et al. (Larson & Starr, 1993) (Mike & Luo, 2000) (Julie, 2005) (Cai & Yin, 2008) (Han & Xue, 2008) (Guo & Jane, 2010) (Wade, Dirk, & Olga, 2011) (Wu,	Entrepreneurial network relationship refers to the relationship established by all parties of entrepreneurial activities and is an important way to obtain incubation resources. The network relationship under business connection can enhance the trust between organizations and bring "scale economy effect" to the organization. Through industrial incubation, industrial upgrading and integration with regional and urban economy, the

2011) (Wu & Xia, 2012) (Lv, 2014)	value chain of entrepreneurship is extended, and the incubating-efficiency is improved.
	The tendency of diffusion of entrepreneurial network from core strong relation circle to peripheral relation circle.
	The incubator should take advantage of its own resources to provide the connection and guidance service of the incubator network, to promote the growth of NE.
	From the communication between organizations to the connection between resources, different network levels are formed. The actual need for incubators to integrate into entrepreneurial networks is to expand access to incubation resources. The establishment of network relationships is generally linked by business alliances and policies.
	In the Chinese context, the effectiveness of entrepreneurial networks depends more on the implementation of adaptive governance mechanisms. The implementation of the governance mechanism helps NE to reduce the cost of partner search, complete complex collaborative tasks, and improve the incubating-efficiency resource allocation. And the relation network is the resource base that NE grows.
Danielle et al.	In the real society, the network relationship environment is complex and dynamic. The

(Danielle, Thomas, & Li, 2004) (Li, Zhou, & Shao, 2009) (Jeremy, Manpreet, Andrew, & Pankaj, 2015)	uncertainty is mainly caused by the diversity of market demand, the speediness of technology iteration and the instability of policy implementation. Over-reliance on network relationships leads to increased costs and homogenization of NE, which in turn leads to decreased performance of enterprises.
Wang Hongwei et al. (Wang, 2008) (Su, Zhou, & Hong, 2011) (Hu, Zhang, & Zhang, 2013) (Wang, Wang, & Xing, 2014)	Incubators build incubation networks to provide information and resources for NE. The direct role of network includes venture capital, business information and angel investment. Indirect effects include entrepreneurial atmosphere, preferential policy information and spillover effect of technology.
	TRM was used to analyze the incubation network, and the four stages of network formation were defined, and the influence of the incubation network on the incubating-efficiency was obtained.
Liu Xiaoying et al. (Liu, 2006) (Zhao & Zhang, 2011) (Zhang, 2016)	With the development of the Internet and information technology, regional and site restrictions have been broken, which makes the sharing and flow of incubation resources more convenient and the cost of incubation resources further reduced. More and more incubators use network technology to realize low-cost operation and further spawn virtual incubators. The cooperation between virtual incubator and venture capital organization can effectively optimize the incubating-efficiency. Generally speaking, the virtual incubator has three kinds of incubation

	network structure, that is, the "central-satellite" model, the "equal subject" model and the "core-intermediary" model.
	Effective performance measurement and evaluation system can promote the improvement of incubating-efficiency, but the simple profit index is not applicable to the evaluation of incubator performance.
Gerhard et al. (Gerhard, 2003) (Chan & Theresa, 2005) (Liu & Shi, 2007) (Wang S., 2007) (Xu, Liu, & Li, 2009) (Li & Zhang, 2012)	Gerhard used the 4E evaluation method to improve the incubating-efficiency.
	In the research of incubating-efficiency, the author used the theory of organization and cluster to put forward 9 influencing factors, such as resource aggregation advantage, resource sharing, consultation service, public image and network advantage.
	The cultivation of professional talents is an effective way to improve efficiency.
Shaker et al. (Shaker & Dennis, 2000) (G.T & Gregory, 2001) (Andreu & Maria, 2003) (Jeffrey, Kimberly, & Dennis, 2006) (Jeffrey, Kimberly, & Dennis, 2006) (Wouter &	EO has a significant impact on improving incubating-efficiency and improving startup performance. Its significance lies in that it reflects the ability of NE to make development plans and implement strategic plans, which have a very important influence on the synergy of incubation resource allocation. When matching incubation resources, the incubator should consider the classification of EO for efficient utilization of resources. By analyzing factors such as network

	Tom, 2008) (Hu, Zhang, & Niu, 2009) (Li, Yao, & Wang, 2010) (Jia, Zhao, Yu, & Wang, 2013) (Xing & Wang, 2015)	strategy, enterprise legitimacy, market orientation, and executive characteristics, it is learned that EO acts on performance by influencing certain innovative behaviors or abilities.
	Wang Hongwei et al. (Wang, 2008) (Susan & Maura, 2012)	The incubation service directly influences the enterprise performance and affects the NE performance. To improve the incubating-efficiency, the incubator should provide services and allocate resources centering on entrepreneurs, strategy formulation, phased allocation of resources for new enterprises, network environment construction, education and skills training, etc. The service provided by an incubator can affect the performance of NE, then affect the performance of NE, and finally affect the incubating-efficiency. Improve the incubating-efficiency by strengthening the service and product resource allocation of the incubator.

Summary of Standardized Evaluation of Incubation-efficiency of Incubators Based on Government

Department of regulation making and issuing	The evaluation index	Description of the regulations
MOST & Agencies	Incubation capacity	Annual graduation rate, employee education and age structure, cumulative investment amount,

		cumulative number of new graduates, and total incubating-space of incubators.
	Growth support	The ratio of management service area to total area, the ratio of incubation fund to incubation area, and the income of incubation service.
	Social benefit	NE accumulated tax amount, employment number, number of intellectual property rights.
Zhejiang Region	Incubation capacity	Incubation funds, incubator space, professional technology and public service capabilities, human resource service capabilities.
	Growth support	Employee qualifications and age structure, management service area and total area ratio, number of cooperative funds.
	Social benefit	Number of employed people, number of intellectual property rights, talent support level.
Existing incubator main service function weakness		
Lack of Investment		Insufficient investment funds for NE development. Lack of professional investment institutions. Difficulties in government guiding funds.
Lack of Policy Support		Lack of individual social welfare funding policies for entrepreneurs. Lack of tax support for NE. Policy support is not systematic.
Lack of Nurturing Support		Lack of entrepreneur training. Lack of professional skills training. Lack of management and strategic training.

Based on the literature review, the measurement indexes, factors and the relationship between the incubating-efficiency and performance adjustment were obtained. As shown in Table 2.8 2 and Figure 2.8 1.

Table 2.8 2 The Summary of Incubation-efficiency Factors & Measurement

Incubation-efficiency Measurement Index			
Input Index		**Output Index**	
Factors	**Index X**	**Factors**	**Index Y**
M	X1：Management and professional staff		Y1：Number of NE
FR	X2：Total amount of incubation fund	*SB*	Y2：Accumulative incubator
MR	X3：Incubation space		Y3：Quantity of intellectual property
C&B	X4：Professional training courses		Y4：employed population
	X5：Number of cooperative organizations (cooperative units)		Y5：Average graduation income
E&N	X6：Policy support or special advantage policies	*EB*	Y6：Cumulative tax amount
Incubation Efficiency-Performance Adjustment Factors		S, R, T, C&B, OS, OSP;	
Technical Efficiency of Incubation Measurement Factors			
	Policy support capacity	The proportion of incubator investment in government public investment. Per capita fiscal expenditure. Supportive policies for entrepreneurship. The total amount of special support funds for government start-up funds and incubators.	
	Regional environmental carrying capacity	Regional per capita GDP Regional per capita consumption; Regional innovation index. Proportion of regional foreign investment in GDP. The number and total amount of venture capital funds. Annual venture capital amount.	
	Intellectual support capacity	The number of regional universities and research institutions and their proportion in the country. Proportion of education graduates. The number of regional patents and their proportion	

	in the whole country. Number of professional incubator employees.
Network collaborative maturity	The total number of incubators and the number of classified incubators. Scale of entrepreneurship association. Number of annual startup activities and project reviews.

M: *Manpower.* FR: *Financial Resources.* OSP: *Operation System & Process.*
N: *Nurturing.* MR: *Material Resources.* E&N: *Environment and Network.*
S: *Strategy.* SB: *Social Benefit.* N&B: *Nurturing & Breeding.*
R: *Resources.* EB: *Economic Benefit.*
T: *Team.* OS: *Organization Structure.*
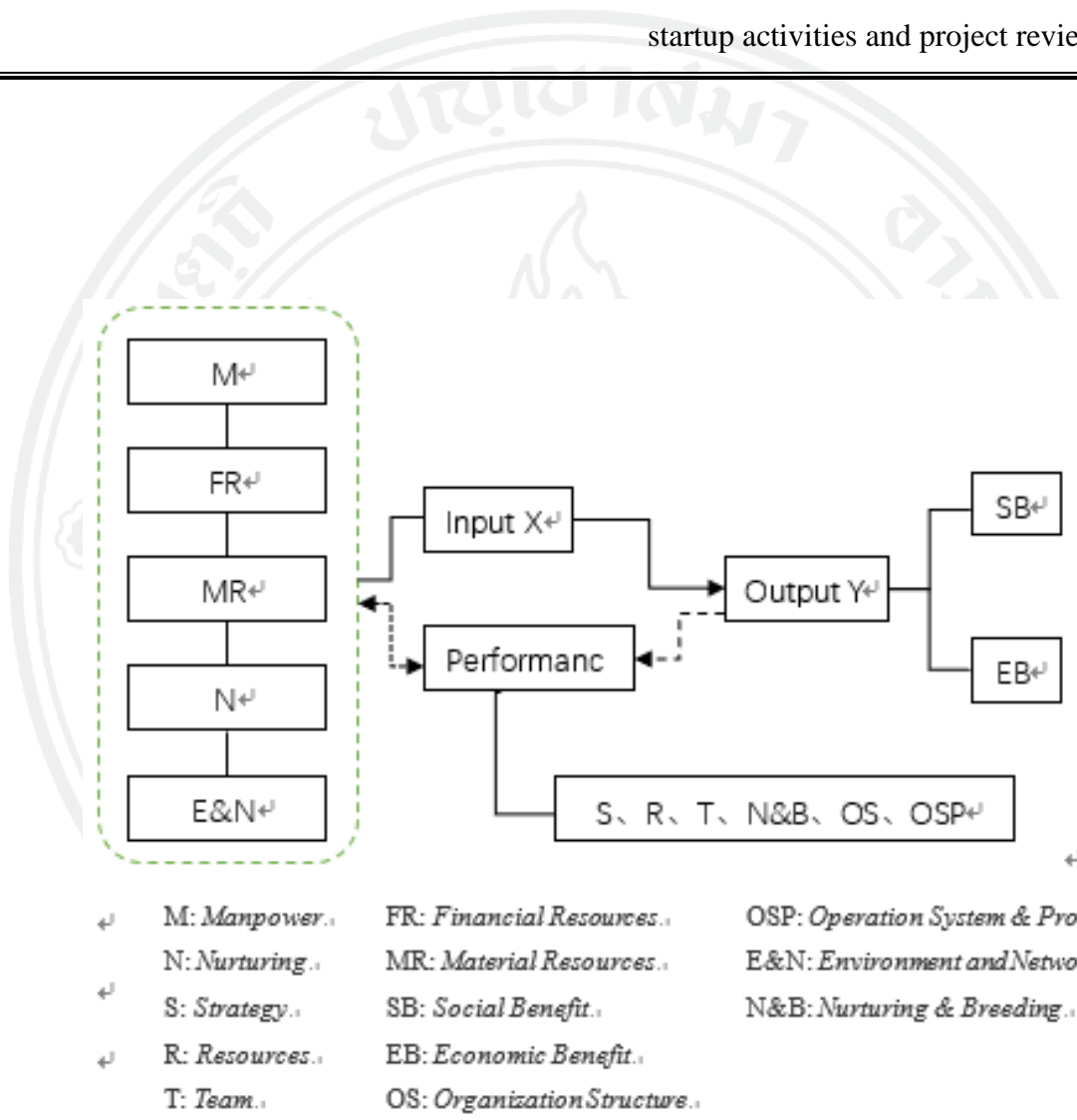
Figure 2.8 1 Incubation Efficiency-Performance Adjustment Model

CHAPTER 3

RESEARCH METHODOLOGY

This study uses a mixture research moth of quantitative and qualitative.

3.1 Quantitative Research

In the part of quantitative research, this paper uses DEA model to measure the incubating-efficiency of incubator.

3.1.1 Research Framework

The purpose of this study is to improve the overall incubating-efficiency of the incubator. The emphasis is on the analysis of the internal and external environment factors and incubation resource elements of the incubator that affect the incubating-efficiency, and the incubation resource allocation model based on its own positioning and industrial characteristics is found out. The main factors affecting the incubating-efficiency, the efficient layered incubation model and the strategy to improve the incubating-efficiency are proposed.
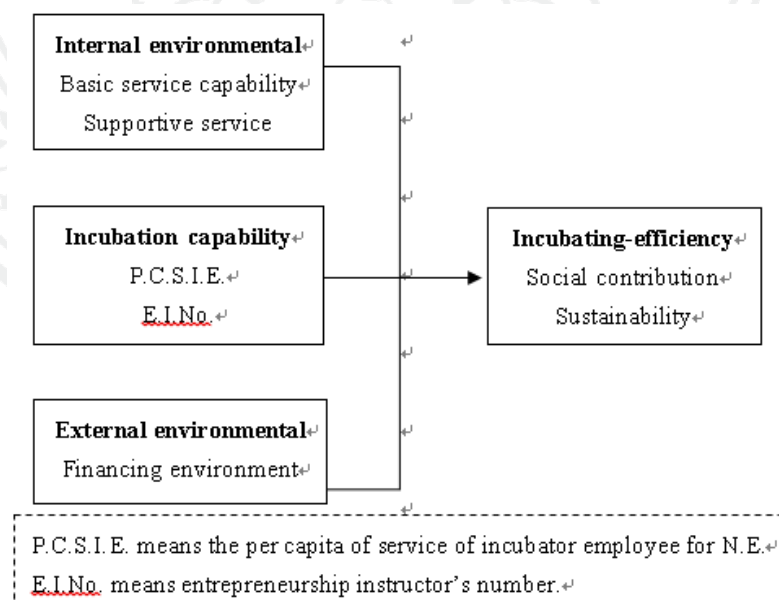
Figure 3.1 1 Research Framework Model

3.1.2 Hypothesis

The basic assumption of this paper is as follows: in the incubation process of NE, the intensity of incubation resource investment and incubating-efficiency have positive effects; The incubator property and funding source had no effect on the incubating-efficiency. Specific assumptions are as follows:

H1：The synergy capacity for the incubation process has a positive impact on the incubating-efficiency.

H2：The incubator's ability to locate the N.E.'s life cycle will have a positive impact on the incubating-efficiency.

H3：A hierarchical regulation of the incubation process for a N.E. has a positive impact on incubating-efficiency.

H4：Knowledge resource and service resource have positive effects on the improving incubating-efficiency.

H5：The incubating-efficiency is related to the funding source and ownership of the incubator.

H6：Hierarchical incubation resources and incubator network connection degree has a positive effect on incubating-efficiency.

H7：The sales of N.E. can reflect incubating-efficiency levels.

H8：The stable cultivation environment constructed by the incubator has a positive influence on the incubating-efficiency.

In this paper, I.V. has 3 dimensions for a total of 5; D.V. has a total of 2, as shown in Table 3.1 1.

Table 3.1 1 I.V. and D.V. of Incubating-efficiency

I.V.	X1: Basic service X2: Supportive service X3: P.C.S.I.E. X4: Entrepreneurship instructor X5: Financing aid
D.V.	Y1: Social contribution Y2: Sustainability

3.1.3 Population

The total sample size of this paper is 59 incubators included in national statistical monitoring in Zhejiang province.

It is the overall distribution of incubators in Zhejiang province. By June 2017, Hangzhou, Ningbo and Jiaxing accounted for about 60% of the total number of incubators in the province. According to the distribution of incubators in Zhejiang province, they are mainly located in Hangzhou, Ningbo and Jiaxing, accounting for about 76.76%. The above data comes from Association of Zhejiang Province science and technology business incubators.

In this paper, 15 representative national incubators will be selected from the total sample.

3.1.4 Sampling

In this paper, the snowball sampling method in the non-probability sampling method is used. Snowball sampling refers to the process of collecting samples from the total samples and then recommending new samples based on the selected samples. In this paper, three typical incubators in Ningbo that researchers are most familiar with were first selected from the total samples. Selection criteria for these three incubators: ①Comprehensive, ②Established long time, ③scale. Based on the recommendation of the sample incubator, the incubators with high recognition in Hangzhou, Jiaxing, Jinhua and Wenzhou were selected for investigation. The advantages of this sampling method are low cost, good sample stability and relatively high sampling efficiency. At the same time, because of peer recommendation, avoid too much research in the subjective selection.

3.1.5 Samples

According to the distribution of the overall samples of incubators included in the statistical monitoring in Zhejiang province, 15 incubators in more concentrated areas such as Hangzhou and Ningbo will be selected as the samples for efficiency measurement. Hangzhou, as the provincial capital, has a relatively concentrated sample with a long operation time, and 7 typical incubators are selected; As a city with municipalities with independent planning status, the incubator policy and statistical data are calculated separately, which is not included in the statistical scope of Zhejiang province, and 4 representative incubators are selected；Jiaxing is in the northern part

of Zhejiang province, bordering Shanghai. In recent years, the construction and development of incubators have been rapid, with prominent geographical advantages, and two typical incubators have been selected. There is Yiwu commercial and trade area in Jinhua city, with obvious economic characteristics, numerous NE, and one representative incubator is selected. As the most developed private economy in China, Wenzhou is also a region where SMEs and entrepreneurs are concentrated. It selects one representative incubator. The specific units to be measured are as follows：

1. Ningbo Yinzhou Yinchuang Entrepreneurship Park Management Services Ltd.
2. Zhejiang University Science Park Ningbo Development Ltd.
3. Ningbo Yinchuang Technology Incubator Management Services Ltd.
4. NNUSP Venture Park
5. Hangzhou Lefu Zhihui Park Incubator Co., Ltd.
6. Hangzhou Dongbu Software Park Ltd.
7. Zhejiang Yinjiang Incubator Ltd.
8. Hangzhou Science and Technology Industrial Park Technology Innovation Service Center
9. Hangzhou Yuhang Hi-tech Industrial Park Incubator Ltd.
10. Bee-Hive in The Dream Town
11. The 7th Space
12. Jiaxing Technology Innovation Service Center
13. Zhejiang Xiuzhou Huigu Technology Innovation Center
14. Jinhua Science Park Innovation Service Center Ltd.
15. Wenzhou Hi-tech Industrial Park Innovation Center

3.1.6 Research Instrument

This paper will carefully select and study the tools of quantitative research based on the characteristics and research purposes of incubating-efficiency measurement.

Design about the Model, Algorithm, and Measure-index of DEA

Incubating-efficiency mainly refers to the research on the relationship between resources input and output, that is, whether the resources in the process of cultivating NE are fully utilized, which is an important condition for measuring whether the incubator has sustainable development value.

Now, the evaluation of efficiency is based on the theory of microeconomics and depends on the calculation of production function. Among them, gross production function or frontier production function are two main efficiency measurement methods. The gross production function describes the relationship between social output, employment and capital. The frontier production function is developed on the basis of random leading-edge row number. As it is closer to the actual operation, the application of this theory has been rapidly developed, and it has become the mainstream method of efficiency measurement at medium and micro level of enterprises and industries. According to the different methods of determining the frontier theory, the technical efficiency calculation is divided into parametric method and non-parametric method. The classification of efficiency measurement method is shown in figure 3.1 2.
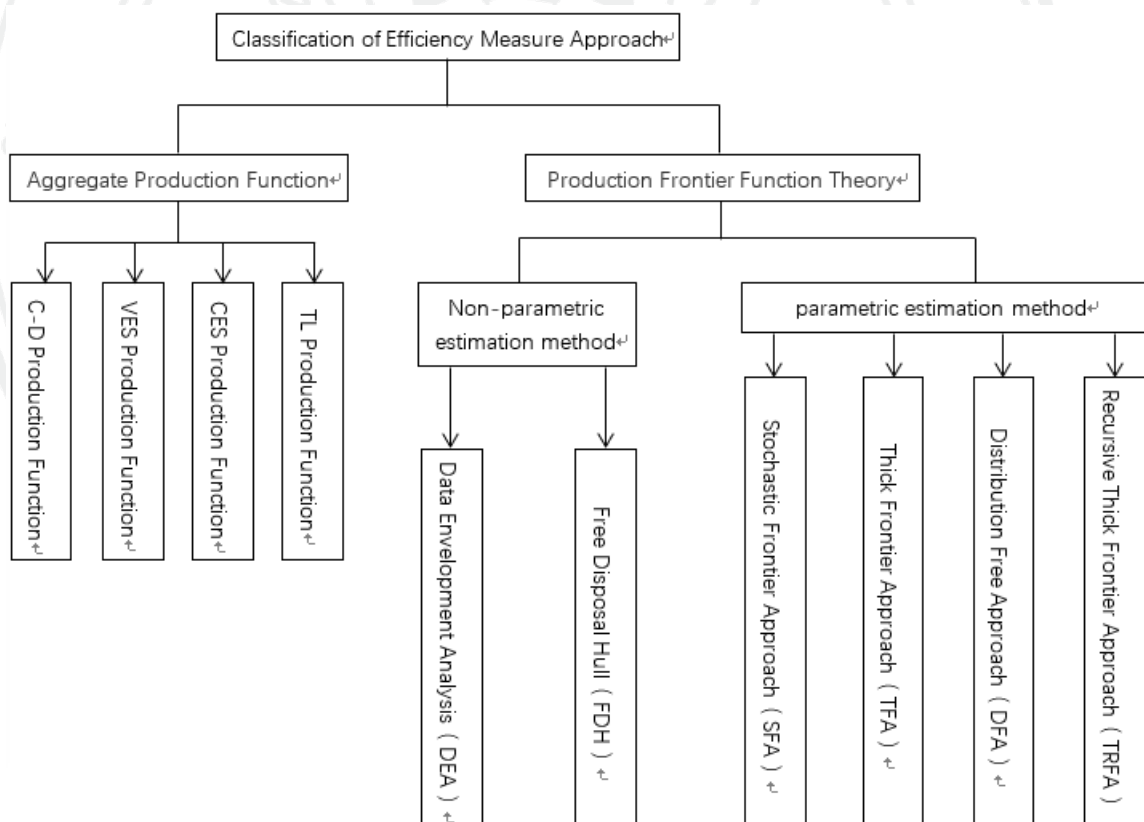
Figure 3.1 2 Classification of Efficiency Measure Methods

All the methods have advantages and limitations. There is no unified conclusion about which method is used in the actual research. Due to the strong applicability of non-parametric method in solving practical problems, it can effectively avoid the dependence of parametric method on model, which has been increasingly favored by relevant researchers. Jing thinks that non-parametric methods have the trend of gradually replacing parametric methods and become the direction of research development(Wang Jing, 2012).

Combined with the nature of the research problem, sample acquisition and data structure, this paper uses DEA method in non-parametric method to measurement the incubating-efficiency. The main advantages of DEA model in efficiency measurement are as follows：

1. Different types of data can be processed synchronously without pre-dimensional data processing.
2. There is no need to determine the index weight. According to DMU data DEA, the optimal weight will be automatically calculated.
3. Efficiency evaluation can be conducted without knowing the specific form of production function. (The incubating-efficiency of an incubator cannot be measured accurately, and the efficiency value is calculated only by referring to multiple input and output conditions of DEA.)
4. Based on the analysis of the efficiency value of each factor and the structure of overall efficiency of the research object, the deficiency of resource allocation can be pointed out and Suggestions for optimization of incubating-efficiency can be provided.

With the development of DEA model measurement technology, many improved models have been evolved. From the characteristics of entrepreneurship activities and the incubators' cultivation of NE, it is easier for the incubators to grasp the resource elements at the input end, that is, compared with the output results of incubation, it is easier to control the input elements. In addition, in actual operation, the incubator is in the state of variable return on scale, which is a dynamic management process for the cultivation of NE. The incubating-efficiency is affected by the incubator scale, coordination capacity, external environment and other factors. Therefore, the non-oriented DEA Model (input-prioritized) is selected to analyze the incubating-efficiency.

According to the CCR Model proposed by Charnes et al.(Charnes, Cooper, & Rhodes, 1978).The basic operation of the model is assumed to be in n DUMs. The input and output of each DUM are m and p, respectively, and then $ℏ_j$ is its efficiency index. As shown in Formula (1).

$$\begin{cases} h_j = \dfrac{\sum_{r=1}^{p} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \\[2ex] j = 1,2,\dots,n \end{cases}$$

Formula（1）

Formula (2) is the relative efficiency of the j_0th DUM. Where $x_{ij} y_{rj}$ is known statistics; with the weight coefficients v_i, u_r as variables; the efficiency index $ℏ_j$ of all DMUs is a constraint. In the DEA calculation, the efficiency of the j_0th DMU is relative to other DMUs, which is a relative concept.

$$\max h_{j0} = \frac{\sum_{r=1}^{p} u_r y_{rj0}}{\sum_{i=1}^{m} v_i x_{ij0}}$$

$$\begin{cases} \dfrac{\sum_{r=1}^{p} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1,\ j = 1,\ 2,\ \cdots,\ n; \\[3ex] v_i,\ u_r \geq 0,\ i = 1,2,\ \cdots,\ m;\ r = 1,2,\ \cdots,\ p; \end{cases}$$

Formula（2）

As shown in Table 3.1.6 about DMUs and its input-output relationship.

Table 3.1 2 the General Input-Output Matrix

	W／D	1	2	…	j	…	n	I
	v_1	x_{11}	x_{12}		x_{1j}		x_{1n}	1
	v_2	x_{21}	x_{22}		x_{2j}		x_{2n}	2
Input	.	.	.	…	.	…	.	.
	.	.	.		.		.	.
	v_m	x_{m1}	x_{m2}		x_{mj}		x_{mn}	m
	u_1	y_{11}	y_{12}		y_{1j}		y_{1n}	1
	u_2	y_{21}	y_{22}		y_{2j}		y_{2n}	2
output	.	.	.	…	.	…	.	.
	.	.	.		.		.	.
	u_p	y_{p1}	y_{p2}		y_{pj}		y_{pn}	p
P.S.: W=Weight D=DMU I=Index								

The BCC Model decomposes technical efficiency(TE) into pure technical efficiency(PTE) and scale efficiency(SE).Specifically, its linear programming is based on the CCR Model and introduces a convexity hypothesis $\sum_{j=1}^{n} \lambda_j = 1$ (Banker et al., 1984).Assume Y_{jk}： 1≤j≤m, Indicates the j-th output variable of the k-th incubator, and m is the number of incubator output variables； X_{jk}： 1≤i≤s,Indicates the i-th input variable of the k-th incubator, s is the number of input variables of the incubator； X_j represents the s-dimensional input vector of the j-th DMU；Y_j represents the m-dimensional input vector of the j-th DMU. Then the calculated efficiency value of the BCC Model is PTE instead of TE.BCC Model Formula is as shown in Formula（3）.

$$
\begin{cases}
\quad\quad min\ \theta \\
s.t. \sum_{j=1}^{n} X_j \lambda_j \leq \theta X_k \\
s.t. \sum_{j=1}^{n} Y_j \lambda_j \leq Y_k \\
s.t. \sum_{j=1}^{n} \lambda_j = 1 \\
\lambda \geq 0，\ j = 1，2，\cdots，n
\end{cases}
$$

Formula（3）

For invalid DMUs, the radial model includes only Proportionate Movement in all input and output indicators when performing efficiency improvements. However, there are still some improvements in the actual situation, that is, invalid DMU improvement = equal ratio improvement + Slack improvement. In order to more fully reflect the impact of various elements in the DMU on the overall efficiency and make the improvement path clearer, Tone et al. proposed the Hybrid Distance algorithm in the DEA model and separated the scale effect(SE) of the DMU. (Cheng, 2014). In general, Hybrid Distance uses a hybrid algorithm that includes multiple distance functions in the same model. The basic relationship of efficiency is expressed as TE=PTE×SE.

1. TE： Comprehensive technical efficiency, that is, the maximum output capacity obtained under given input.

2. SE： It reflects whether to operate under the most appropriate investment scale.

3. PTE：It reflects the production efficiency of an enterprise due to factors such as management and technology.

According to the development status and operation characteristics of the incubator industry in Zhejiang province, this paper adopts the radial distance calculation of some indexes in the model parameter setting, and the other indexes is the mixed algorithm of non-radial measurement. The model planning formula is as shown in Formula (4).

$$\min\beta = \frac{1 - \frac{m_1}{m}(1 - \theta) - \frac{1}{m}\sum_{i=1}^{m_2} s_i^{N-}/x_{ik}^N}{1 + \frac{q_1}{q}(\varphi - 1) + \frac{1}{q}\sum_{r+1}^{q_2} s_r^{N+}/y_{ik}^N}$$

$$\text{s.t.} \quad X^R\lambda + s^{R-} - \theta x_k^R = 0$$

$$X^N\lambda + s^{N-} = x_k^N$$

$$Y^R\lambda - s^{R+} - \varphi y_k^R = 0$$

$$Y^N\lambda - s^{N+} = y_k^N$$

$$\lambda, s^-, s^+ \geq 0$$

Formula（4）

Based on the above DEA Model comparison, the technical efficiency and pure efficiency of sample incubator incubation were measured through the non-oriented DEA Model (input-prioritized), and the incubating-efficiency grade and influencing factors were analyzed on this basis. Provide information support for future in-depth interviews.

3.1.7 Data Collection

According to the requirements of the non-oriented DEA Model (input-prioritized), the data in this paper will be quantitatively studied by adopting normative official statistical data. In this study, the statistical yearbook of the ministry of science and technology, the government of Zhejiang province and the national torch center were consulted, and relevant government policies and documents were interpreted to collect important data needed for the evaluation of the incubator efficiency in Zhejiang province. The 2017 China Torch Statistical Yearbook is the main data source.

3.1.8 Data Analysis

For the analysis of collected data, data processing and efficiency measurement analysis were conducted by using DEA analysis software MaxDEA, and effective DMU of efficiency measurement was obtained. When the key factors of data were

extracted, the HAC analysis and calculation were carried out by SPSS software, and the factors affecting the core incubation resources of the incubator were obtained.

Specifically, multiple input and output indicators need to be determined when studying the efficiency of an incubator using the DEA model. Therefore, the use of statistical data includes input indicators and output indicators. The collection of specific indicators draws on the research of Xin Wang et al., and also refers to the relevant documents of the official incubator management requirements of Zhejiang Province(Wang Jing, 2012). According to the characteristics of the incubator, it will start from the hatch resource input indicators both material resources and services resources: Material resources include investment in incubation funds and space of incubation sites; service resources include the scope of incubation services, the number of entrepreneurial instructors, and access to external investment and financing. As a commercial infrastructure and public policy tool, incubators should consider social benefits, in addition to economic benefits in the setting of output variables. Therefore, the number of employed persons and the total income of the incubator are included in the selection of output indicators. The Non-output index system of incubating-efficiency of incubators is as shown in Fig.3.1 3.
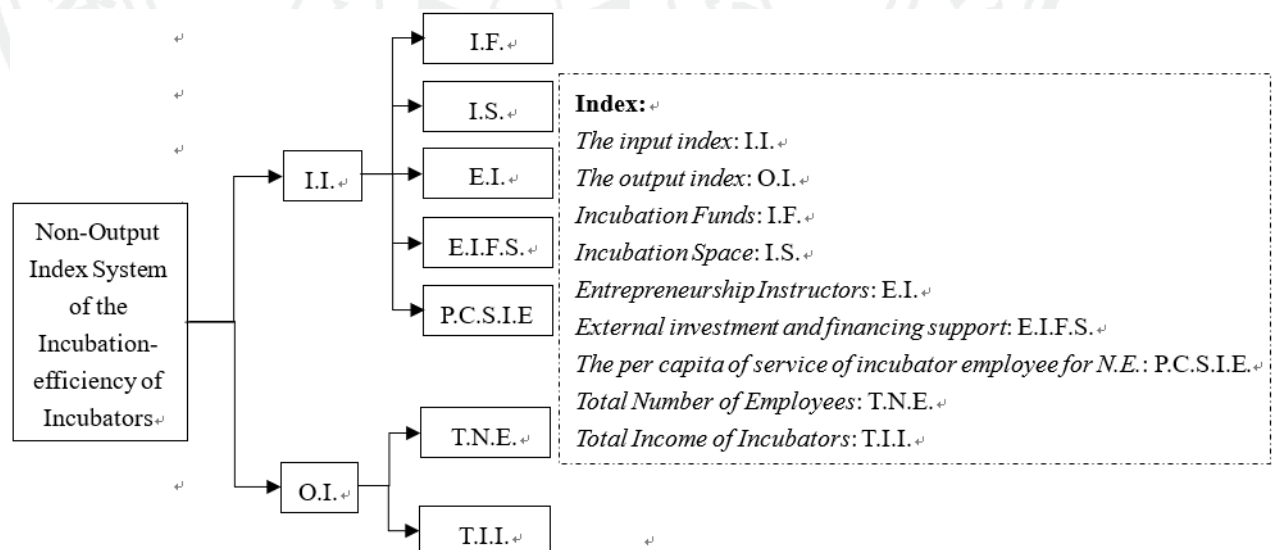
Figure 3.1 3 The Non-output index system of incubating-efficiency of incubators

The Reliability and Validity in Quantitative

In this paper, uses the data from the government statistical yearbook in the quantitative research section. The yearbook data has the characteristics of stable structure, high credibility and scientific method. Moreover, the Non-Oriented DEA Model (Input-Prioritized) is used in the research and analysis. According to the characteristics of the DEA method, DEA is a linear programming method without dimension and pretreatment, which is widely used in related efficiency research. Therefore, the quantitative research part of this paper does not need to be tested for reliability and validity.

3.2 Qualitative Research

In the qualitative research part, this paper mainly uses the literature research method and the deep interview method and cooperates with cluster analysis.

3.2.1 Research Objectives

The qualitative research part of this paper is to be included in the survey of Zhejiang Province statistical monitoring incubators, entrepreneurial research institutions and government regulatory agencies. The list of specific units is as follows：

1. Ningbo Yinzhou Yinchuang Entrepreneurship Park Management Services Ltd.

2. Yonggang Modern Park

3. Yinzhou Business Incubating Development Area

4. iINCUBATOR Co., Ltd.

5. Hangzhou Lefu Zhihui Park Incubator Co., Ltd.

6. Hangzhou Hi-tech Industrial Park Entrepreneurship Services Center

7. Nanhu S & T Incubation Services Center

8. Jiaxing S & T Incubation Center

9. Jinhua Science Park Innovation Service Center Ltd.

10. Zhejiang Science and Technology Business Incubator Association

11. The Hong Kong Polytechnic University, China

12. Nankai University, China

13. Ningbo Dahongying University, China

3.2.2 In-depth Interview

This article will conduct an in-depth interview with a total of 21 people, that is, each incubator management staff, a total of 9 people; each incubator service object 1 each, a total of 9; incubator supervision of a government official; incubator researchers 2 name. The list of interviewees is shown in Table 3.2.2(1). The selection criteria of the object are 2 dimensions and 4 types. The 2 dimensions are the incubator researcher dimension and the incubator management and operation participant dimensions; the four types are the incubator researcher, the incubator operator, the incubator supervisor, and the incubator service object. Selection criteria are shown in 3.2 3.

Table 3.1 3 the Names of In-depth Interview

INTERVIEWEES	UNITS	POSITION/ROLE
Q. X. Kong	Ningbo Yinzhou Yinchuang Entrepreneurship Park Management Services Ltd. （NYYCEP）	Manager
Z. Zhang		Entrepreneur
C. L. Zhao	Yonggang Modern Park （YGMP）	Manager
Z. H. Ying		Entrepreneur
B. Liu	Yinzhou Business Incubating Development Area（YBIDA）	Manager
L. Liu		Entrepreneur
Y. Shi	iINCUBATOR Co., Ltd.	Manager
Z. F. Xu		Entrepreneur
Y. P. Zhang	Hangzhou Lefu Zhihui Park Incubator Co., Ltd.（LFZHP）	Manager
Eunice		Entrepreneur
X. X. Tang	Hangzhou Hi-tech Industrial Park Entrepreneurship Services Center （HZHIP）	Manager
X. B. Xia		Entrepreneur
H. F. Luo	Nanhu S & T Incubation Services Center（NHST）	Manager
G. Chen		Entrepreneur
B. Zhu		Manager

X. Xiao	Jiaxing S & T Incubation Center（JXSTI）	Entrepreneur
F. Xu	Jinhua Science Park Innovation Service Center Ltd.（JHSPI）	Manager
Y. W. Zhou		Entrepreneur
X. T. Xia	Zhejiang Science and Technology Business Incubator Association（ZSTIA）	Administrator
Eric	The Hong Kong Polytechnic University, China（HKPU）	Researcher
J. Qin	Nankai University, China（NKU）	Researcher
X. L. Tang	Ningbo Dahongying University, China（DHYU）	Researcher

Table 3.1 4 The selection Criterion of interviewee

Dimension	Type	Remark
P.R.	I	Specialist, Prof., Researcher;
	II	The senior management of incubator;
P.I.D.	III	Government Regulator, Investor;
	IV	N.E, Staff, Business partner;

Description:

Professional Researcher：P.R.

Practitioner in the Incubator Domain：P.I.D.

Type I: A specialist of Incubator, who focus on the research development of incubator in china for long time.

Type II: The man is an operator or management of incubator.

Type III: Person, who is an owner or investor or officer of government, is the main supervisor.

Type IV: The incubator service object, including the N.E and external personnel with business relations.

3.2.3　Research Instrument

This study will first design an outline of in-depth interviews, and in the interviews mainly based on the outline questions and control. At the beginning of the interview, the background of the research will be done and the necessary communication with the interviewees will be carried out to alleviate the concerns of the interviewees and guide the interviewees' opinions on relevant issues to be fully expressed. At the same time, interviewees are encouraged to provide information about relevant research, allowing interviewees to talk about what they are interested in. After the interview, cluster analysis will be carried out with SPSS. The outline of the in-depth interview is shown in AppendixⅠ.

3.2.4　In-depth Interview Questions Collection

The interview is dominated by face-to-face in-depth interview, which will be assisted by remote video if the face-to-face interview cannot be reached. The interview content is recorded in the form of audio recording or interview notes. The interview is executed according to the interview outline designed in advance. Usually, the interviewee will make an appointment with the interviewee one week in advance, and the interviewee will be informed of the topics of this interview in advance, so that the interviewee can prepare. The time of each interview is limited to about 60 minutes, and the interview location is mainly confirmed by the interviewee. To keep the interview from interference, the interview is usually conducted in a quiet and private place. The process and structure design of the interview refer to the research of Kvale(Kvale, 1997). In the first stage: introduce the main purpose and significance of this study to interviewees and understand their thoughts and basic judgments. The focus of his work is to enhance mutual understanding and make interviewees understand interview boundaries, terms and some basic concepts, to lay the foundation for the next stage of work. The interview process in this stage is open; In the second stage, the interviewees were interviewed semi-structured according to the interview outline. The focus is to understand the allocation of incubation resources, business process of incubator, new enterprise, and other substantive issues related to research.

3.2.5　Data analysis

After the interview, the research will sort out the interview data and conduct qualitative research based on the literature and theory, and finally form the interview report. For the analysis of qualitative research materials in this paper, KJ method is mainly used for induction and summary. Main process: material summarization → information analysis, KJ processing → induction → summary.

CHAPTER 4
RESULTS AND DISCUSSION

In this Chapter，paper will present the research results, findings and discussion.

4.1   Overview of Research Results

Based on the relevant data of Zhejiang provincial department of science and technology, the present status of incubators in the region and the characteristics of incubation efficiency were obtained.

Firstly, from the perspective of industrial structure layout, the NE cultivated by incubators in Zhejiang province are mainly focused on electronic information technology, scientific and technological service industry, traditional industrial upgrading service, biological medicine technology, new material technology and new energy technology. The number of NE in the electronic information technology industry is the largest, including software development technology, microelectronics technology, computer and network technology, communication technology and other industries, accounting for about 60 percent of all incubated NE. Secondly, from the source of funding for the operation of the incubator, it mainly relies on government or non-profit organization's subsidies, and in terms of property rights, it belongs to government departments or social groups. Therefore, the pressure on the incubator to make profits is not high, which leads to the more traditional thinking of the incubator operation and management, and the efficient use of resources loses its power. Others, the access to resources and market development are not all dependent on market channels.

The second, the incubator industry in Zhejiang province is not in a completely competitive market, and administrative barriers to some extent cause the reverse elimination mechanism of the incubator industry. In recent years, with the acceleration of industrial iteration brought by technological changes, regional competition for talents and new technological resources has become increasingly fierce, thus changing the external environment of incubator operation. This results in the optimization pressure of the external environment on the efficiency of the incubator industry, that is,

the market environment shapes the demand for efficient incubators, thus forcing the incubating-efficiency of the entire region to have the external power of optimization.

Finally, based on the development characteristics of incubators in Zhejiang province and regional industrial structure, the distribution of measured samples selected by this research is shown in Table 4.1.

Figure 4.1 1 Incubators Quantity Distribution Diagram in Zhejiang, China
Source: Association of Zhejiang province science and technology business incubators

Table 4.1 1 the Summary of Measure DMUs

ITEM OF INCUBATOR	LOCATION	LEVEL/TYPE	ESTABLISH	DMU CODE
Ningbo Yinzhou Yinchuang Entrepreneurship Park Management Services Ltd.	NINGBO	STATE	2012	BI1
Zhejiang University Science Park Ningbo Development Ltd.	NINGBO	STATE	2001	BI2
Ningbo Yinchuang Technology Incubator Management Services Ltd.	NINGBO	STATE	2008	BI3
NNUSP VENTURE PARK	NINGBO	STATE	2009	BI4
Hangzhou Lefu Zhihui Park Incubator Co., Ltd.	HANGZHOU	STATE	2010	BI5
Hangzhou Dongbu Software Park Ltd.	HANGZHOU	STATE	2001	BI6
Zhejiang Yinjiang Incubator Ltd.	HANGZHOU	STATE	2007	BI7
Hangzhou Science and Technology Industrial Park Technology Innovation Service Center	HANGZHOU	STATE	1990	BI8
Hangzhou Yuhang Hi-tech Industrial Park Incubator Ltd.	HANGZHOU	STATE	2007	BI9
Bee-Hive in The Dream Town	HANGZHOU	STATE	2015	BI10
The 7th Space	HANGZHOU	STATE	2016	BI11
Jiaxing Technology Innovation Service Center	JIAXING	STATE	1999	BI12
Zhejiang Xiuzhou Huigu Technology Innovation Center	JIAXING	STATE	2009	BI13
Jinhua Science Park Innovation Service Center Ltd.	JINHUA	STATE	2001	BI14
Wenzhou Hi-tech Industrial Park Innovation Center	WENZHOU	STATE	2001	BI15

Source: Science Technology Department of Zhejiang Province

4.2   Analysis and Results

In this section will present the details of research results and findings.

4.2.1   The Measure-index Construction of DEA Model

The standardized operation of the efficiency measurement index is to better reflect the incubating-efficiency evaluation accuracy of the incubator. The operating principle is set as follows：

1.   Scientific Principle

Indicators are research services, usage specifications. Reference materials should be authoritative and stable.

2.   Representativeness Principle

It follows the 80/20 theoretical principle, that is, it reflects the efficiency characteristics of index construction and avoids the overlapping of index connotation.

3.   Feasibility principle

Data collection should be available and economical, and the applicability of the measurement model should also be considered.

4.   Simplicity principle

The indicators should be set directly to the purpose of the study, in terms of presentation and structure to strive for conciseness.

5.   Dynamic and static combination principle

The indicators are static, and the changes and development continuity of the incubator should also be considered.

In accordance with the above criteria selection principles, the establishment of the incubating-efficiency indicator system will be considered from two aspects: input and output. In terms of input, it will start from human and non-human resources; In terms of output, as the incubator is different from traditional business organizations, the setting of output indicators will consider both economic benefits and social benefits.

This paper combines the development status of the incubator in Zhejiang province with the factor demand for the development of NE and the hypothesis of incubating-efficiency in pre-sequence research and builds the measurement indexes of DEA model around the incubation environment and incubation capacity.

1.   Environmental factor

Any organization will be constrained and challenged by various environmental factors in its daily operation. This paper will extract corresponding DEA efficiency measurement indicators by focusing on the resource elements needed for the growth of NE and combining with the internal and external environmental factors of incubator operation. To be specific, the measurement index of incubating-efficiency will be constructed from the dimensions of basic service capacity, supportive service capacity, policy support environment and investment and financing environment of the incubator. The external environment is composed of investment factors and government support factors, and the indicators mainly reflect the ability of the incubator to obtain external resource support.

2. Incubation capacity

The strength of incubation ability will directly affect the incubating-efficiency, and it is also the embodiment of the core competitiveness of the incubator. Incubation ability mainly refers to the ability of the incubator to supply the resources needed for the NE to grow in a certain period, including software support, hardware resource input, and the incubator's own management level. These capabilities are combined to reflect the number of entrepreneurial instructors who can provide entrepreneurial coaching and support in the incubator, as well as the number of incubator staff per capita. Therefore, in terms of incubating ability, this paper will build the measurement index of incubating-efficiency based on the number of entrepreneurial tutors and the scope of service.

3. Incubating-efficiency

The incubating-efficiency is mainly reflected in the final output of the incubator. In addition to the economic benefits of other organizations, social benefits are also included in the results. For any organization, profitability is an important indicator of economic performance, which can well reflect the sustainability and stability of organization development. At the same time, the social benefits of the incubator as a public policy tool are well evaluated. The paper considers the output of the incubator from the aspects of economic benefit and social benefit. Based on the dimensions of social contribution and sustainable development ability, it will construct the evaluation index of incubation efficiency. The sustainable development ability mainly refers to the

survival ability of the incubator itself, which is mainly reflected from the financial indicators.

The specific incubating-efficiency of the incubator DEA measurement index is shown in Table 4.2 1.

Table 4.2 1 the measure index of incubating-efficiency

Input-Output Factors	Variable	Determination Index
D1: Interior Environment	X1: Basic Service	i1: Incubation Space
	X2: Support Service	i2: Incubation Funds
D2: The Capability of Incubation	X3: Service Range	i3: The Per Capita of Service of Incubator Employee for N.E.
	X4: Instructor	i4: Entrepreneurship Instructors
D3: External Environment	X5: Financing Aid	i5: External Investment and Financing Support
D4: Produce	Y1: Social Contribution Degree	o1: Total No. of Employees
	Y2: Sustainable Development	o2: Total Income of Incubator

4.2.2 Incubating-efficiency measuring

The incubating-efficiency measurement of DMUs was basically set as follows：

1. The Non-Oriented Model (Input-priorized) will be used in the measurement of incubating-efficiency；

2. Each measurement sample is set to a DMU；

3. The input measurement index is i1，i2，i3，i4，i5；

4. The output measurement index is o1，o2；

5. The numerical value of TE and PTE and SE are calculated by the model；

Based on the statistical yearbook of the regulator, the actual data indicators of the sample incubator are indexed. The specific transformed data of DEA model operation is shown in Table 4.2 2.

Table 4.2 2 The Input-output Indicators of Measure DMUs

DMUs	i1	i2	i3	i4	i5	o1	o2
BI1	32066	15525000	2	72	202168000	1383	2541000
BI2	25041	2262757	2	22	113878	1071	11522385
BI3	102094	9475297	4	14	4500050	1150	11498157
BI4	20000	25000000	5	25	2500000	450	14705882
BI5	31781	2828447	4	5	29744506	1487	27531265
BI6	16002	848534	1	14	15548506	685	112706389
BI7	39553	2545602	3	18	47101433	783	4742365
BI8	91195	2201380	7	9	67578510	1008	13145628
BI9	32617	848534	4	11	61862	501	4702340
BI10	1200	5000000	3	10	35000000	150	1657300
BI11	1600	5360000	5	6	43100000	196	1416400
BI12	41138	848534	3	11	19540640	1249	5539290
BI13	49479	848534	2	16	3420601	1020	5609771
BI14	48185	12303743	2	25	136175228	3142	7802360
BI15	147540	848534	2	27	156129	1692	15880033

The details of general statistics of DMUs by DEA are shown as Table 4.2 3.The algorithm of model was taken by Hybrid Distance（Radial and SBM Fields，Non-Oriented，Input-priorized）[20].

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20 Hybrid equals radial model, if all measure index set-up was radial. Hybrid equals SBM model, if all measure index set-up was non-radial.

Table 4.2 3 The General Statistics of DMUs by DEA

ITEM	SUM TOTAL	AVERAGE
Incubation Space X1：I.S.	679491	45299.4
Incubation Funds X2：I.F.	86744896	5782993.067
The Per Capita of Service of Incubator Employee for N.E. X3：P.C.S.I.E.	49	3.266666667
Entrepreneurship Instructors X4：E.I.	285	19
External Investment and Financing Support X5：E.I.F.S.	606709343	40447289.53
Total No. of Employees Y1：T.N.E.	15967	1064.466667
Total Income of Incubator Y2：T.I.I.	241000565	16066704.33

The Operation of DEA Model

The data of Table 4.2 2 was put into the software of MaxDEA 7visions.The DMUs' results of Technical Score（TE）, Pure Technical Score（PTE）, Scale Effect （SE）, and Scale Elasticity, all which are represented the incubating-efficiency value of DMus, were calculated by Hybrid Distance Function and Multiplier Model. The parameters of DEA model setting are shown as Figure 4.2 1 and Figure 4.2 2.
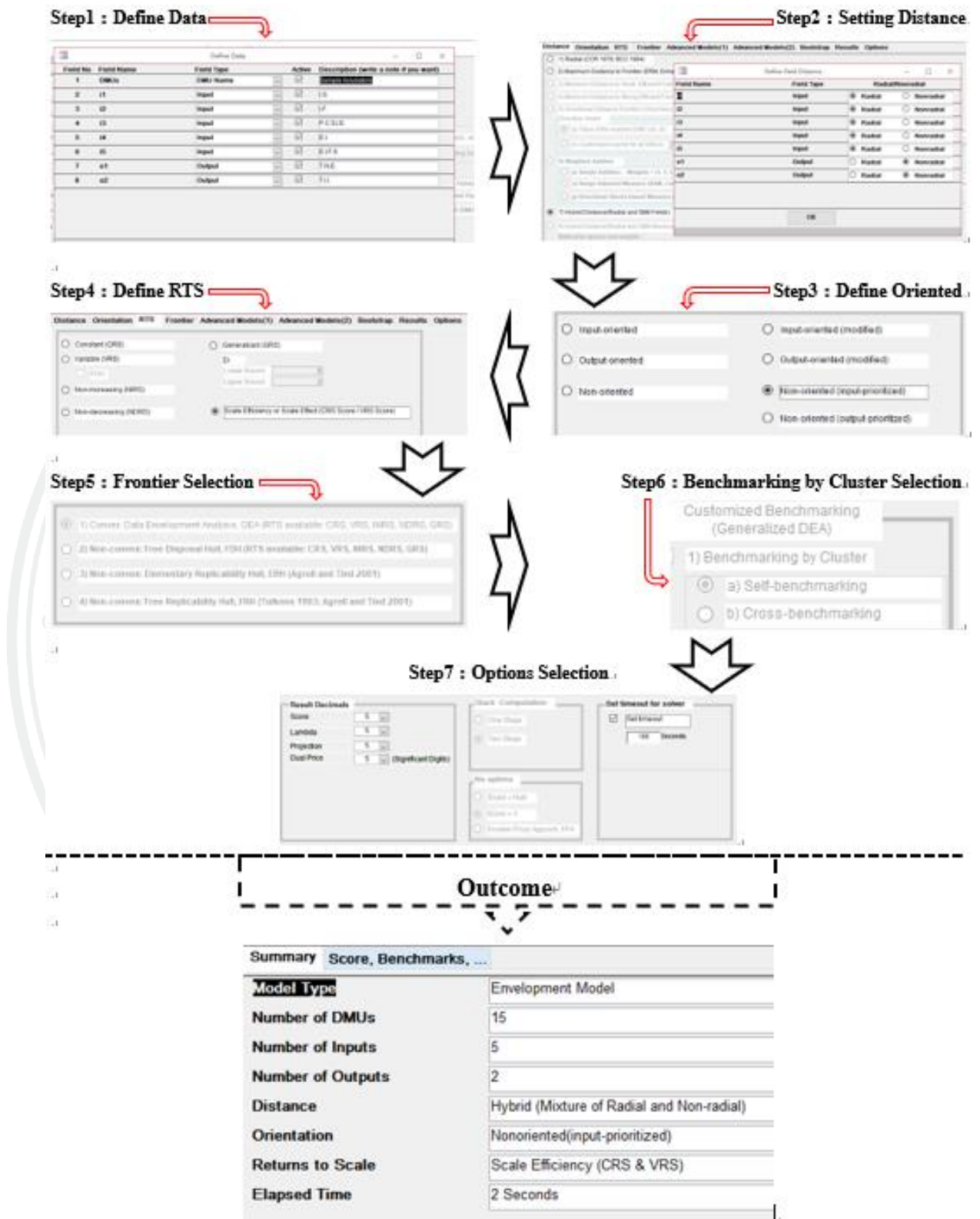
Figure 4.2 1 the Operation Parameter Setting of Hybrid Distance Function

Figure 4.2 2 the Operation Parameter Setting of Multiplier Model

The deviation values of STDEV.S of DMUs were calculated as TE=0.271, PTE=0.851 and SE=2.338 (data was processed with rounding approximation with 3 decimal places reserved). By comparing the values of STDEV.P, it can be known that the overall efficiency level of the incubator in Zhejiang province is similar to that of the sample incubator, and the sample representation is better. The statistical overview of STDEV.S and STDEV.P is shown in Table 4.2 4.

Table 4.2 4 the Summery Eigenvalues of DMUs

Classification Effectiveness	Min Val.	Max Val.	Mean	STDEV.S	STDEV.P	DMU Effective Proportion of Sample
TE	0.093	1	0.842	0.271	0.262	66.667%
PTE	0.054	1	0.851	0.851	0.323	80%
SE	0.549	10.013	1.587	2.338	2.259	66.667%
Sample of RTS						
Increasing (DMU No.)		Constant (DMU No.)				IRS Proportion of Sample
5		10				33.333%

Remarks:
Value Decimals 3   IRS: Increasing Returns to Scale
SE: Scale Effect Score   Adoption of Hybrid Distance (Radial & SBM) by DEA

The specific numerical distribution of the DMUs measured by Hybrid Model is shown in Table 4.2 5. Combined with the results of Table 4.2 4, the TE lowest value of measured DMU is about 0.093, the highest value is 1, and the mean value is 0.842. The differences in the deviations of TE, PTE and SE confirmed the intergenerational differences in the development level of the incubating-efficiency between the incubators in the region. In addition, from the proportion of DMU, the effective ratio of incubating-efficiency of Zhejiang incubator is about 66.667%. Among them, the effective proportion of PTE is 80%, and that of SE is 66.667%. From the perspective of RTS, SE needs to improve more space than PTE, and the scale efficiency level of each incubator is unbalanced, among which about one-third of the incubators are in IRS.

Table 4.2 5 the Summery of Hybrid Model

DMU	TE(CRS)	PTE(VRS)	SE	RTS
BI1	0.54089	0.05402	10.01338	Increasing
BI2	1	1	1	Constant
BI3	1	1	1	Constant
BI4	0.54915	1	0.54915	Increasing
BI5	1	1	1	Constant
BI6	1	1	1	Constant
BI7	0.09286	0.06417	1.44698	Increasing
BI8	0.63642	0.64616	0.98493	Increasing
BI9	0.80392	1	0.80392	Increasing
BI10	1	1	1	Constant
BI11	1	1	1	Constant
BI12	1	1	1	Constant
BI13	1	1	1	Constant
BI14	1	1	1	Constant
BI15	1	1	1	Constant

Property	Value
Distance	Hybrid (Mixture of Radial and Non-radial)
Orientation	Non-oriented(input-prioritized)
Returns to Scale	Scale Efficiency (CRS & VRS)

Moreover, from the results of incubating-efficiency is effectiveness. In general, TE value can be used to determine whether the production capacity of an organization is fully released, that is, whether there is possibility of improvement in DMU. At the same time, it can also judge the overall incubating-efficiency of the incubator, namely the strength of the incubation capacity (Wang Jing, 2012). When TE<1, the incubator did not make full use of all the incubation resources it input, resulting in the output value lower than the input value, and the incubating-efficiency of the incubator was

low. When PE=1, the incubator is at the production frontier, which indicates that the incubator has made full use of the input resources and has achieved the optimal output at the present stage.

From the results of the RTS measurement of the Hybrid Distance and the weight distribution of each stage, the overall incubating-efficiency of VRS is higher than that of CRS. In other words, the incubating-efficiency of the incubator is greatly affected by the change of scale efficiency, and the incubator can improve the technical efficiency through the improvement of scale efficiency (SE). The Results of Weights of VRS and CRS by Hybrid Distance is shown as table 4.2 6.

Table 4.2 6 The Results of Weights of VRS & CRS by Hybrid Distance

DMU	S.	D.P.(i1)	D.P.(i2)	D.P.(i3)	D.P.(i4)	D.P.(i5)	D.P.(o1)	D.P.(o2)
				CRS				
BI1	0.54	-3.04656E-05	0.	-0.0115446	0.	0.	0.000474546	6.45724E-12
BI2	1.	-0.000037248	0.	0.	0.	-5.90748E-07	2.33427E-08	8.67854E-08
BI3	1.	0.	-9.8778E-09	0.	-0.0539888	-3.34579E-08	0.000869543	2.17426E-12
BI4	0.55	-1.67652E-05	0.	0.	0.	-2.65879E-07	3.19123E-08	3.90596E-08
BI5	1.	0.	0.	0.	-0.2	0.	0.000239478	2.33878E-08
BI6	1.	0.	0.	0.	-0.0714286	0.	3.64964E-08	8.87239E-09
BI7	0.09	-7.94777E-06	-9.54641E-08	-0.0912618	-0.00938017	0.	0.000628433	2.59404E-12
BI8	0.64	0.	-2.60791E-07	0.	-0.0473221	0.	0.000574654	4.34902E-09
BI9	0.8	-5.37255E-06	0.	0.	-0.0745757	-7.16288E-08	0.00166508	4.43517E-12
BI10	1.	-0.000383903	0.	-0.0117787	0.	-1.43994E-08	0.00647623	1.72366E-08
BI11	1.	-0.000304058	-9.58034E-08	0.	0.	0.	0.00500467	1.34743E-08
BI12	1.	0.	-1.34524E-07	0.	-0.0458342	-1.95324E-08	0.00080062	4.51321E-12
BI13	1.	-9.33977E-06	-3.75568E-07	0.	0.	-6.40809E-08	0.000940361	7.27867E-09
BI14	1.	0.	0.	-0.0734149	-0.0144872	-3.60557E-09	0.000318261	3.20416E-12
BI15	1.	-4.90929E-06	-2.44289E-07	0.	0.	-4.38071E-07	1.47754E-08	6.29706E-08

DMU	S.	D.P.(i1)	D.P. (i2)	D.P. (i3)	D.P. (i4)	D.P. (i5)	D.P. (o1)	D.P. (o2)	u*
					VRS				
BI1	0.05	-2.56017E-05	0.	-0.09	0.	0.	0.0003721	7.45878E-12	0.24
BI2	1.	-3.43907E-06	0.	-0.14	-0.03	-2.60257E-08	2.33427E-08	2.16969E-12	1.
BI3	1.	0.	-1.71307E-08	0.	-0.05	-3.12282E-08	0.000671424	2.17426E-12	0.23
BI4	1.	-0.000039279	-5.93925E-09	0.	0.	-2.63751E-08	5.55556E-08	1.7E-12	1.
BI5	1.	0.	0.	0.	-0.09	-1.83559E-08	1.68124E-08	9.08059E-13	1.
BI6	1.	0.	-1.9848E-07	0.	-0.06	0.	3.64964E-08	1.66298E-09	0.81
BI7	0.06	0.	0.	-0.11	-0.04	0.	2.00943E-08	3.31771E-12	0.63
BI8	0.6	0.	-1.93389E-07	0.	-0.06	0.	2.14782E-08	1.64693E-12	0.87
BI9	1.	-3.43639E-06	0.	-0.14	-0.03	-2.60474E-08	4.99002E-08	5.3165E-12	1.
BI10	1.	-1.81501E-05	0.	0.	-0.04	-1.7377E-08	1.66667E-07	1.50848E-11	1.
BI11	1.	-1.02455E-05	0.	0.	-0.06	-1.43155E-08	1.27551E-07	2.17355E-09	1.
BI12	1.	0.	-9.10857E-08	0.	-0.04	-2.20294E-08	0.000573667	4.51321E-12	0.28
BI13	1.	0.	-7.08706E-08	-0.17	-0.02	-6.4599E-08	2.45098E-08	5.31108E-09	0.97
BI14	1.	-2.30274E-06	0.	0.	0.	-6.52867E-09	0.000454662	3.20416E-12	-0.43
BI15	1.	0.	-7.74744E-08	-0.17	-0.0213097	-7.17975E-08	1.47754E-08	1.5743E-12	1.

Remarks:
S.= Score   D.P.= Dual Price   Value Decimals 2.

In addition, by means of the duality principle, the calculation of DEA Multiplier Model is adopted to verify the consistency of sample efficiency measurement results, which reflects the stability of hatch efficiency calculation results. The value results of Multiplier Model are shown as Table 4.2 7, Table 4.2 8, and Table 4.2 9.

Table 4.2 7 The Summery and Weights of DMUs by Multiplier

Property	Value	
Model Type	Multiplier Model	
Distance	Radial	
Orientation	Non-oriented	
Returns to Scale	Scale Efficiency (CRS & VRS)	
Weight Computation	2 Stage	

DMU	TE(CRS)	PTE(VRS)	SE	RTS	Scale Elasticity (Upper Bound)	Scale Elasticity (Lower Bound)
BI1	0.65616	0.72469	0.90543	Increasing	1.74779	0.97254
BI2	1	1	1	Constant	22567.3028	0.11767
BI3	1	1	1	Constant	2.37244	0.76361
BI4	0.57428	1	0.57428	Increasing	36535.2927	6.11291
BI5	1	1	1	Constant	13935.512	0.1716
BI6	1	1	1	Constant	8209.0862	0.00006
BI7	0.49212	0.50187	0.98058	Increasing	1.64821	0.359
BI8	0.63632	0.76355	0.83338	Increasing	16908.1185	0.33195
BI9	0.83416	1	0.83416	Increasing	49707.0602	1.36897
BI10	1	1	1	Constant	160140.252	0.68186
BI11	1	1	1	Constant	133425.173	0.50662
BI12	1	1	1	Constant	22387.1197	0.24774
BI13	1	1	1	Constant	26707.88	0.59452
BI14	1	1	1	Constant	1.71238	0.00021
BI15	1	1	1	Constant	14717.6993	0.00099

Table 4.2 8 The Results of VRS & CRS by Multiplier Model

DMU	S.	P. (i1)	P. (i2)	P. (i3)	P. (i4)	P. (i5)	P. (o1)	P. (o2)
VRS								
BI1	0.72	26953.22	6051683.28	1.68	17.89	66977273.66	1603.51	54938598.48
BI2	1	25041	2262757	2	22	113878	1071	11522385
BI3	1	102094	9475297	4	14	4500050	1150	11498157
BI4	1	20000	25000000	5	25	2500000	450	14705882
BI5	1	31781	2828447	4	5	29744506	1487	27531265
BI6	1	16002	848534	1	14	15548506	685	112706389
BI7	0.5	24805.19	1701459.87	2.01	12.03	23818187.83	1042.65	72671643.36
BI8	0.76	36138.44	1906425.91	3.53	7.79	24992691.35	1376.17	17289873.25
BI9	1	32617	848534	4	11	61862	501	4702340
BI10	1	1200	5000000	3	10	35000000	150	1657300
BI11	1	1600	5360000	5	6	43100000	196	1416400
BI12	1	41138	848534	3	11	19540640	1249	5539290
BI13	1	49479	848534	2	16	3420601	1020	5609771
BI14	1	48185	12303743	2	25	136175228	3142	7802360
BI15	1	147540	848534	2	27	156129	1692	15880033
CRS								
BI1	0.66	25412.46	7332467.96	1.59	14.87	77498795.27	1669.97	4377849.53
BI2	1	25041	2262757	2	22	113878	1071	11522385
BI3	1	102094	9475297	4	14	4500050	1150	11498157
BI4	0.57	14593.85	1250868.62	1.13	12.81	1824231.45	624.24	18680991.05
BI5	1	31781	2828447	4	5	29744506	1487	27531265
BI6	1	16002	848534	1	14	15548506	685	112706389
BI7	0.49	26092.33	1679282.86	1.98	11.87	24175316.62	1049.47	61024638.82
BI8	0.64	32283.58	1712280.74	3.16	7	22410979.97	1231.96	16066303.61
BI9	0.83	29669.2	731428.27	0.84	10.01	56271.15	546.28	5513908.54
BI10	1	1200	5000000	3	10	35000000	150	1657300
BI11	1	1600	5360000	5	6	43100000	196	1416400
BI12	1	41138	848534	3	11	19540640	1249	5539290
BI13	1	49479	848534	2	16	3420601	1020	5609771
BI14	1	48185	12303743	2	25	136175228	3142	7802360
BI15	1	147540	848534	2	27	156129	1692	15880033

Remarks:

S.= Score   P.= Projection   Value Decimals 2

Table 4.2 9 The Results of Weights of VRS & CRS of By Multiplier

DMU		BI1	BI2	BI3	BI4	BI5	BI6	BI7	BI8	BI9	BI10	BI11	BI12	BI13	BI14	BI15
VRS																
S.		0.72	1	1	1	1	1	0.5	0.76	1	1	1	1	1	1	1
i1	W.	1.69E-05	1.46E-06	1.47E-06	2.49E-05	1.01E-06	3.46E-07	6.78E-10	6.78E-10	2.49E-05	0	1.98E-05	2.32E-06	3.93E-06	9.2E-07	5.99E-07
	W.V.	0.54	0.04	0.15	0.5	0.03	0.01	0	0	0.81	0.03	0.03	0.1	0.19	0.04	0.09
i2	W.	4E-12	6.12E-10	3.19E-11	8.22E-10	4.2E-10	1.72E-08	3.61E-08	1.93E-07	8.22E-10	4E-12	4E-12	3.97E-08	4E-12	4E-12	4E-12
	W.V.	0	0	0	0.02	0	0.01	0.09	0.43	0	0	0	0.03	0	0	0
i3	W.	0.06	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	0.11	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	0.06	1.43E-05	0.08
	W.V.	0.12	0	0	0	0	0	0.34	0	0	0	0	0	0.11	0	0.17
i4	W.	1.39E-06	0.02	0.02	0.02	0.01	1.39E-06	0.02	0.06	0.02	0.02	0.03	0.01	0.03	0	0.01
	W.V.	0	0.46	0.27	0.42	0.07	0	0.34	0.57	0.19	0.18	0.2	0.11	0.4	0.01	0.31
i5	W.	4.95E-13	1.93E-08	1.68E-08	2.34E-08	1.33E-08	3.09E-08	4.95E-13	4.95E-13	2.34E-08	2.26E-08	1.69E-08	1.06E-08	1.31E-08	2.66E-09	3.35E-09
	W.V.	0	0	0.08	0.06	0.39	0.48	0	0	0	0.79	0.73	0.21	0.04	0.36	0
o1	W.	0	0	0	3.18E-08	0	3.18E-08	0	3.18E-08	3.18E-08	3.18E-08	0	0	0	0	0
	W.V.	0.34	0.47	0.51	0	0.45	0	0.23	0	0	0	0.04	0.56	0.24	0.58	0.44
	%.	100.00%	93.51%	100.00%	52.33%	89.33%	0.00%	100.00%	73.34%	79.26%	76.45%	100.00%	100.00%	100.00%	100.00%	100.00%
o2	W.	8.87E-13	2.82E-09	8.88E-13	8.87E-13	1.94E-09	4.44E-09	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13
	W.V.	0	0.03	0	0	0.05	0.5	0	0	0	0	0	0	0	0	0
	%.	0.00%	6.49%	0.00%	47.67%	10.67%	100.00%	0.00%	26.66%	20.74%	23.55%	0.00%	0.00%	0.00%	0.00%	0.00%
u*		-0.16	0	0.02	-1	0	0	-0.2	-0.87	-1	-1	-0.93	0.11	-0.51	0.17	-0.13
CRS																
S.		0.72	1	1	1	1	1	0.5	0.76	1	1	1	1	1	1	1
i1	W.	1.69E-05	1.46E-06	1.47E-06	2.49E-05	1E-06	3.46E-07	6.78E-10	6.78E-10	2.49E-05	2.5E-05	1.98E-05	2.32E-06	3.93E-06	9.2E-07	5.99E-07
	W.V.	0.54	0.04	0.15	0.5	0.03	0.01	0	0	0.81	0.03	0.03	0.1	0.19	0.04	0.09
i2	W.	4E-12	6.12E-10	3.19E-11	8.22E-10	4.2E-10	1.72E-08	3.61E-08	1.93E-07	8.22E-10	4E-12	4E-12	3.97E-08	4E-12	4E-12	4E-12
	W.V.	0	0	0	0.02	0	0.01	0.09	0.43	0	0	0	0.03	0	0	0
i3	W.	0.06	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	0.11	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	0.06	1.43E-05	0.08
	W.V.	0.12	0	0	0	0	0	0.34	0	0	0	0	0	0.11	0	0.17
i4	W.	1.39E-06	0.02	0.02	0.02	0.01	1.39E-06	0.02	0.06	0.02	0.02	0.03	0.01	0.03	0	0.01
	W.V.	0	0.46	0.27	0.42	0.07	0	0.34	0.57	0.17	0.18	0.2	0.11	0.4	0.01	0.31
i5	W.	4.95E-13	1.93E-08	1.68E-08	2.34E-08	1.33E-08	3.09E-08	4.95E-13	4.95E-13	2.34E-08	2.26E-08	1.69E-08	1.06E-08	1.31E-08	2.66E-09	3.35E-09
	W.V.	0	0	0.08	0.06	0.39	0.48	0	0	0	0.79	0.73	0.21	0.045	0.36	0
o1	W.	0	0	0	3.18E-08	0	3.18E-08	0	3.18E-08	3.18E-08	3.18E-08	0	0	0	0	0
	W.V.	0.34	0.47	0.51	0	0.45	0	0.23	0	0	0	0.04	0.56	0.24	0.58	0.44
	%.	100.00%	93.51%	100.00%	52.33%	89.33%	0.00%	100.00%	73.34%	79.26%	76.45%	100.00%	100.00%	100.00%	100.00%	100.00%
o2	W.	8.87E-13	2.82E-09	8.87E-13	8.87E-13	1.94E-09	4.44E-09	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13	8.87E-13
	W.V.	0	0.03	0	0	0.05	0.5	0	0	0	0	0	0	0	0	0
	%.	0.00%	6.49%	0.00%	47.67%	10.67%	100.00%	0.00%	26.66%	20.74%	23.55%	0.00%	0.00%	0.00%	0.00%	0.00%
u*		-0.16	0	0.018	-1	0	0	-0.2	-0.87	-1	-1	-0.93	0.12	-0.51	0.17	-0.13

Remarks:
S.= Score   W.= Weight   W.V.= Weighted Value   Value Decimals 2

On the other hand, since the price information in the input factors of the incubator is known, the study further utilized the price information in the input index to measure the Allocation Efficiency (AE) of the incubator. AE is mainly obtained by calculating the ratio of cost efficiency and technical efficiency, i.e. AE=CE/TE. The AE value indicates the incubator's ability to use resources, reflecting its efficiency in converting incubation resources into outputs. In the specific calculation of AE, because the capital allocation is the core of resource allocation, this paper is based on the i2 and i5 input indicators in DMU. Through calculation, the average value of AE of the incubator in Zhejiang province is 0.0958, which means the incubator in Zhejiang has relatively low-cost efficiency and large management cost, reflecting the generally low management

efficiency of the incubator. The specific AE calculation results of each DMU are shown in Table 4.2 10.

Table 4.2 10 the elaborating Results of A.E.

| DMU | IMPE1 | | | | | IMPE2 | | | | | RTS | A.E. |
| | C.E.(CRS) | P.C.E.(VRS) | S.E. | Weights | | C.E.(CRS) | P.C.E.(VRS) | S.E. | Weights | | | |
				VRS S.	CRS S.				VRS S.	CRS S.		
BI1	0	0	0.8174	0	0	0	0	0.8174	0	0	I	0
BI2	0.0941	0.1297	0.7256	0.1297	0.0941	0.0941	0.1297	0.7256	0.1297	0.0941	I	0.0941
BI3	0.0027	0.0037	0.7241	0.0037	0.0027	0.0027	0.0037	0.7241	0.0037	0.0027	I	0.0027
BI4	0.0011	0.0012	0.9261	0.0012	0.0011	0.0011	0.0012	0.9261	0.0012	0.0011	I	0.0021
BI5	0.0029	0.0089	0.3213	0.0089	0.0029	0.0029	0.0089	0.3213	0.0089	0.0029	D	0.0029
BI6	0.1891	1	0.1891	1	0.1891	0.1891	1	0.1891	1	0.1891	D	0.1891
BI7	0.0001	0.0001	0.4628	0.0001	0.0001	0.0001	0.0001	0.4628	0.0001	0.0001	I	0.0007
BI8	0.0001	0.0002	0.8278	0.0002	0.0001	0.0001	0.0002	0.8278	0.0002	0.0001	I	0.0002
BI9	0.1068	0.3606	0.2961	0.3606	0.1068	0.1068	0.3606	0.2961	0.3606	0.1068	I	0.1328
BI10	0	0.0001	0.1044	0.0001	0	0	0.0001	0.1044	0.0001	0	I	0
BI11	0	0	0.1158	0	0	0	0	0.1158	0	0	I	0
BI12	0.0006	0.0009	0.7382	0.0009	0.0006	0.0006	0.0009	0.7382	0.0009	0.0006	I	0.0006
BI13	0.0118	0.0196	0.6028	0.0196	0.0118	0.0118	0.0196	0.6028	0.0196	0.0118	I	0.0118
BI14	0	1	0	1	0	0	1	0	1	0	D	0
BI15	1	1	1	1	1	1	1	1	1	1	C	1

Property	Value	Mean
Distance	Cost（Type II）	
Orientation	Input-oriented	0.0958
Returns to Scale	Scale Efficiency（CRS & VRS）	

Remarks
C.E. : Cost Efficiency Score　　P.C.E. : Pure Cost Efficiency Score　　S.E. : Scale Effect Score　　Value Decimals 4
I：Increasing　　D.：Decreasing　　C.：Constant　　A.E. : Allocative Efficiency

The Operation of HAC

To deeply understand the difference of efficiency between incubators in Zhejiang province, better analyze the causes of the difference, and provide basis for the optimization of incubator incubation path and improvement of incubating-efficiency. In this paper, the results of DEA measurement are analyzed by HAC.

TE reflects the overall technical efficiency of the incubator, while AE reflects the unit allocation efficiency under the known conditions of the input price of incubation resources. The two reflect the efficiency of the incubator from different perspectives, but any indicator is not comprehensive enough to describe the incubating-efficiency of the incubator. To make the incubating-efficiency of all incubators more comprehensive and balanced when quantified, this paper takes TE, AE as the basis, and refers to the efficiency values of PTE, SE and CE as the analysis basis of HAC. Furthermore, in the process of data processing, HAC has been verified that the calculated results after

standardization of original data are consistent with the direct application of original data analysis. When the HAC is configured for the category, two results are generated, which are divided into three categories and two categories. However, due to the small difference between the clusters of DMUs classified into three categories, and the overall conclusion is no different from the two categories, to effectively find out the main factors affecting the incubating-efficiency, this paper is divided into two categories after comparison and consolidation. The calculation is completed by SPSS 24 software, As Shown in Table 4.2 11.
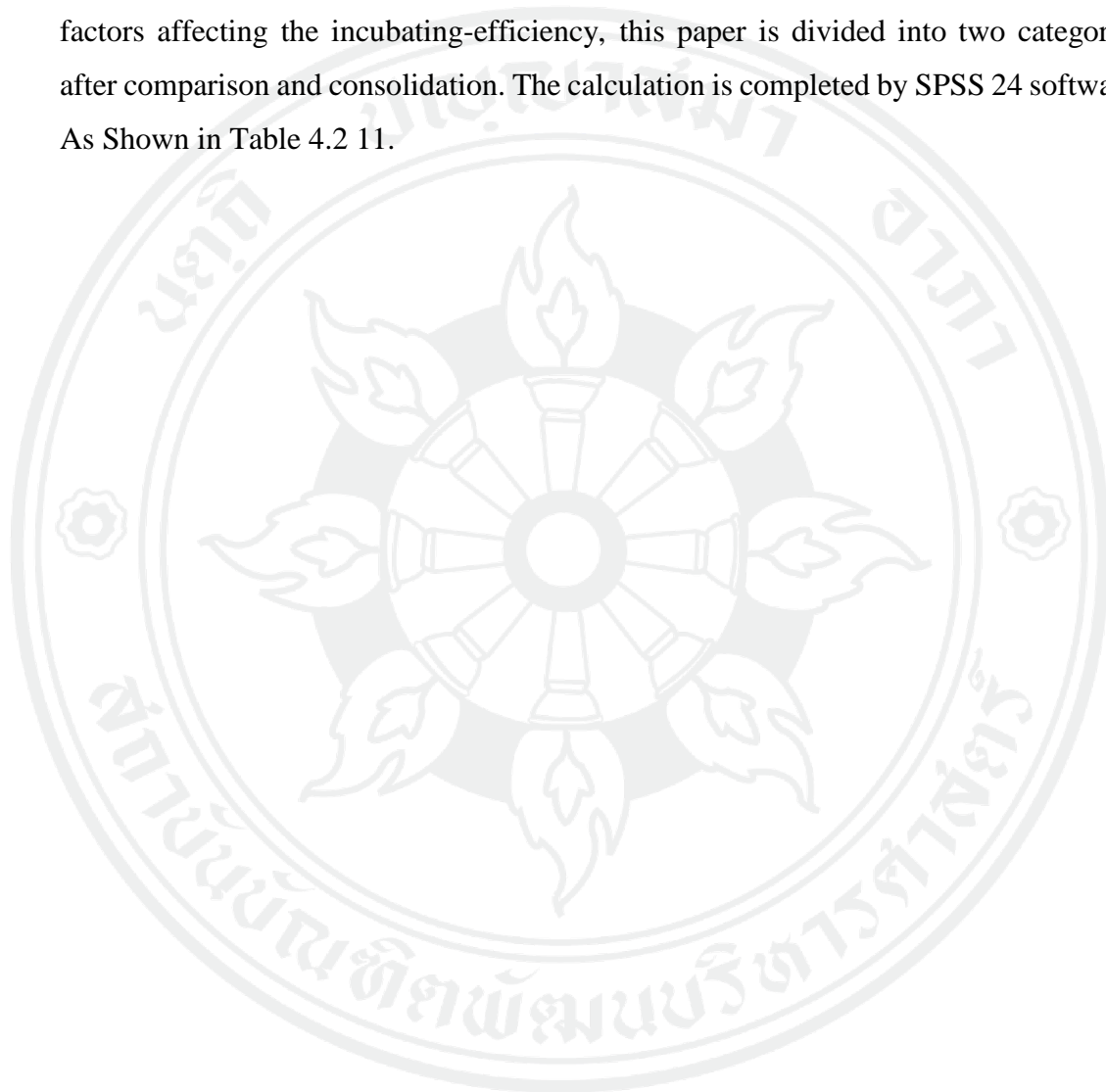
Table 4.2 11 Summarize Note of Cluster

Cluster Summarize Note		
Input	Data	The results of DEA
	N of Rows in Working Data File	DMUs 15
Missing Value Handling	Definition of Missing	For each dependent variable in a table, user-defined missing values for the dependent and all grouping variables are treated as missing.
	Cases Used	Cases used for each table have no missing values in any independent variable, and not all dependent variables have missing values.
Syntax		PROXIMITIES TE AE CE /MATRIX OUT(D0.4501648945298494) /VIEW=CASE /MEASURE=SEUCLID /PRINT NONE /ID=DMUs /STANDARDIZE=VARIABLE RESCALE. Summarize /TABLES=TechnicalEfficiencyScoreCRS PureTechnicalEfficiencyScoreVRS ScaleEffectScore BY DMU /FORMAT=VALIDLIST CASENUM TOTAL LIMIT=100 /TITLE='Case' /MISSING=VARIABLE /CELLS=COUNT MEAN MEDIAN MIN MAX STDDEV.

DMUs Processing Summary						
	DMUs					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
TE(CRS) * Sample	15	100.0%	0	0.0%	15	100.0%
PTE(VRS) * Sample	15	100.0%	0	0.0%	15	100.0%
SE * Sample	15	100.0%	0	0.0%	15	100.0%

	Valid		Missing		Total	
A.E./C.E.	N	Percent	N	Percent	N	Percent
Squared Euclidean Distance used	15	100%	0	0%	15	100%

The correlation matrix formed by the efficiency values of A.E. and T.E. of DMUs during clustering is shown in Table 4.2 12, and the output value has been standardized.

Table 4.2 12 Proximity Matrix of A.E. & T.E.

Proximity Matrix

Rescaled Squared Euclidean Distance

Case	1:BI1	2:BI2	3:BI3	4:BI4	5:BI5	6:BI 6	7:BI 7	8:BI 8	9:BI 9	10:BI 10	11:BI 11	12:BI 12	13:BI 13	14:BI 14	15:BI 15
1:BI1	.000	.114	.109	.000	.109	.129	.104	.005	.046	.109	.109	.109	.109	.109	.685
2:BI2	.114	.000	.005	.110	.005	.005	.430	.073	.021	.005	.005	.005	.004	.005	.473
3:BI3	.109	.005	.000	.105	.000	.020	.425	.068	.030	.000	.000	.000	.000	.000	.573
4:BI4	.000	.110	.105	.000	.105	.125	.108	.004	.043	.105	.105	.105	.105	.105	.678
5:BI5	.109	.005	.000	.105	.000	.020	.425	.068	.030	.000	.000	.000	.000	.000	.572
6:BI 6	.129	.005	.020	.125	.020	.000	.445	.089	.022	.021	.021	.020	.018	.021	.379
7:BI 7	.104	.430	.425	.108	.425	.445	.000	.153	.271	.425	.425	.425	.425	.425	1.000
8:BI 8	.005	.073	.068	.004	.068	.089	.153	.000	.025	.068	.068	.068	.068	.068	.644
9:BI 9	.046	.021	.030	.043	.030	.022	.271	.025	.000	.030	.030	.030	.028	.030	.453
10:BI 10	.109	.005	.000	.105	.000	.021	.425	.068	.030	.000	.000	.000	.000	.000	.576
11:BI 11	.109	.005	.000	.105	.000	.021	.425	.068	.030	.000	.000	.000	.000	.000	.576
12:BI 12	.109	.005	.000	.105	.000	.020	.425	.068	.030	.000	.000	.000	.000	.000	.575
13:BI 13	.109	.004	.000	.105	.000	.018	.425	.068	.028	.000	.000	.000	.000	.000	.562
14:BI 14	.109	.005	.000	.105	.000	.021	.425	.068	.030	.000	.000	.000	.000	.000	.576
15:BI 15	.685	.473	.573	.678	.572	.379	1.000	.644	.453	.576	.576	.575	.562	.576	.000

This is a dissimilarity matrix

A.E. and T.E. take square Euclidean distance and inter-group connection as the algorithm basis of HAC analysis, and the clustering pedigree chart formed in the process is shown in figure 4.2 3.
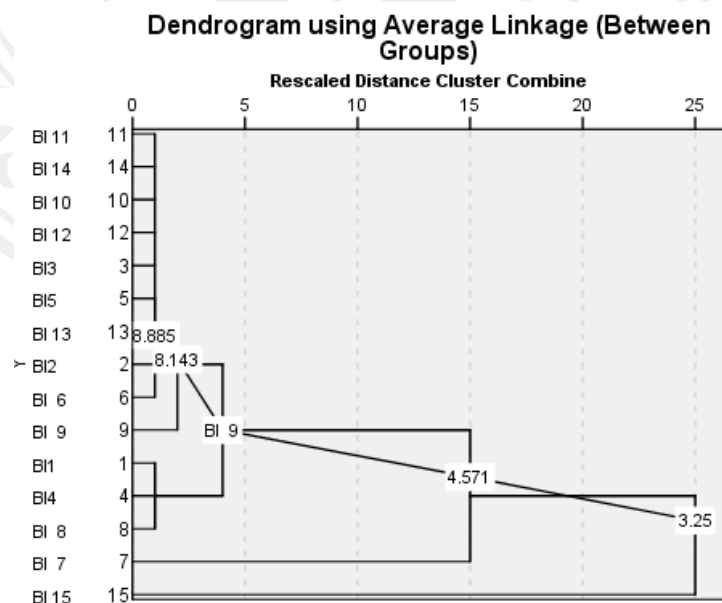

Figure 4.2 3 HAC Pedigree Chart

HAC analysis was conducted on the efficiency values of A.E., T.E., PTE, SE and CE. The correlation matrix was formed as shown in Table 4.2 13, and the output values were standardized.

Table 4.2 13 Proximity Matrix of 5 Factors

Proximity Matrix

Rescaled Squared Euclidean Distance

Case	1:BI1	2:BI2	3:BI3	4:BI4	5:BI5	6:BI 6	7:BI 7	8:BI 8	9:BI 9	10:BI 10	11:BI 11	12:BI 12	13:BI 13	14:BI 14	15:BI 15
1:BI1	.000	.464	.459	.436	.459	.479	.288	.324	.445	.459	.459	.459	.459	.459	1.000
2:BI2	.464	.000	.005	.055	.004	.005	.345	.057	.010	.005	.005	.005	.004	.005	.444
3:BI3	.459	.005	.000	.050	.000	.019	.340	.052	.017	.000	.000	.000	.000	.000	.538
4:BI4	.436	.055	.050	.000	.050	.069	.193	.022	.024	.050	.050	.050	.050	.050	.589
5:BI5	.459	.004	.000	.050	.000	.019	.340	.052	.017	.000	.000	.000	.000	.000	.537
6:BI 6	.479	.005	.019	.069	.019	.000	.359	.071	.012	.019	.019	.019	.017	.019	.355
7:BI 7	.288	.345	.340	.193	.340	.359	.000	.126	.272	.340	.340	.340	.340	.340	.880
8:BI 8	.324	.057	.052	.022	.052	.071	.126	.000	.035	.052	.052	.052	.052	.052	.593
9:BI 9	.445	.010	.017	.024	.017	.012	.272	.035	.000	.017	.017	.017	.016	.017	.428
10:BI 10	.459	.005	.000	.050	.000	.019	.340	.052	.017	.000	.000	.000	.000	.000	.541
11:BI 11	.459	.005	.000	.050	.000	.019	.340	.052	.017	.000	.000	.000	.000	.000	.541
12:BI 12	.459	.005	.000	.050	.000	.019	.340	.052	.017	.000	.000	.000	.000	.000	.540
13:BI 13	.459	.004	.000	.050	.000	.017	.340	.052	.016	.000	.000	.000	.000	.000	.528
14:BI 14	.459	.005	.000	.050	.000	.019	.340	.052	.017	.000	.000	.000	.000	.000	.541
15:BI 15	1.000	.444	.538	.589	.537	.355	.880	.593	.428	.541	.541	.540	.528	.541	.000

This is a dissimilarity matrix

It means, A.E., T.E., PTE, SE, CE, take square European distance and inter-group connection as the algorithm basis of HAC analysis. The clustering pedigree chart formed in the process is shown in Fig.4.2 4.
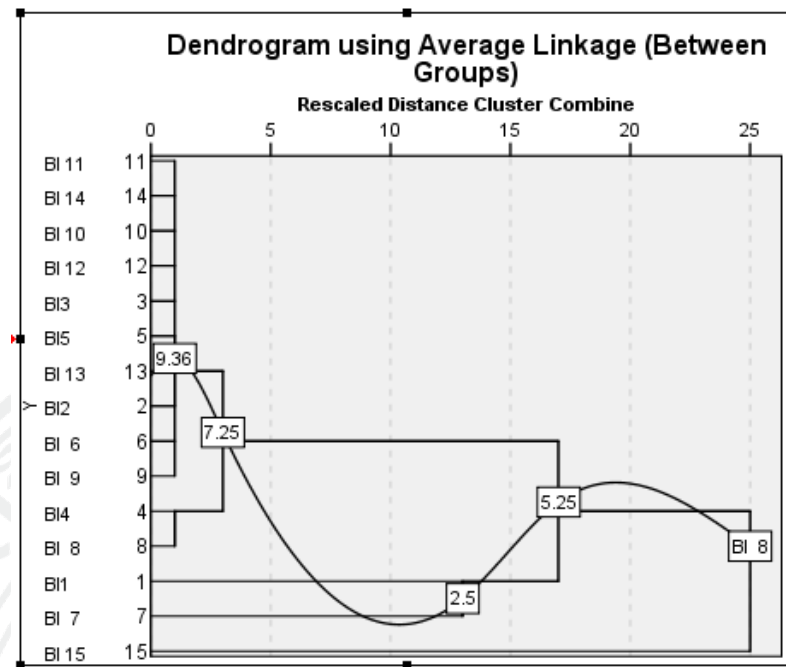
Figure 4.2 4 HAC Pedigree Chart

4.2.3 The Results Analysis of Quantitative Research

In the quantitative part of this study, the following quantitative research results were obtained through the calculation of incubation efficiency value of the incubator and the clustering analysis of DEA calculation results.

First, the TE value of the incubator is not yet effective, and there is some room for improvement. This also reflects that the overall incubating-efficiency of the incubator in Zhejiang is in an invalid state, and there is still room for improvement in the technical efficiency. From the analysis of TE, PTE and SE, there is a large gap in the level of incubating-efficiency between incubators in the region, and the development is unbalanced. This difference is mainly caused by the difference in control ability between pure technical efficiency and scale efficiency, especially the imbalance in scale efficiency. Therefore, the construction of incubator in Zhejiang province should focus on the utilization of resources already invested, control the expansion in scale, and optimize the allocation and combination of incubation resources among incubators, to improve the balance of overall development and the incubating-efficiency of individual incubators.

Secondly, according to the relationship between TE, PTE and SE, TE can be improved by improving the input of PTE or controlling the scale of SE to achieve the optimal incubating-efficiency of the incubator. The goal of strong and effective improvement of DMU efficiency is to achieve Pareto optimum. It is generally realized that the path first completes the proportional improvement, and then the relaxation is improved, that is, Projection to Strong Efficient Frontier（SEF）=Proportionate Movement + Slack Movement。The improved path diagram is shown in Fig.4.2 5. In addition, when DMU=1 is efficient and effective, it is also possible that the slack variable does not reach 0, that is, most incubators are in a weakness efficiency. At this point, the incubation efficiency can be improved by improving the relaxation variable, so that the DMU can achieve strong efficiency. At present, there are two - way or one - way operational Spaces in the incubator of Zhejiang province.

Figure 4.2 5 The Demonstration of Projection movement to SEF

Thirdly, by comparing Table4.2 6 and Table4.2 8, it can be found that the Hybrid Model and the Multiplier Model are corresponding, that is, in the state of CRS, BI1, BI4, BI7, BI8 and BI9 are in the increasing stage of RTS, while the rest DMU are in

the constant stage of RTS (the scale gains are stable). In the VRS state where PTE is separated, BI1, BI7 and BI8 are in the state of DMU inefficiency, which indicates that the pure technical efficiency of BI1, BI7 and BI8 needs to be improved when the effect of scale efficiency is removed. From the proportion of samples, it can be inferred that about 20% of incubators in Zhejiang province have room for PTE improvement. The improvement of PTE mainly lies in the improvement of software, such as the entry of external factors such as entrepreneurship mentor, incubation capital and industry docking, as well as the generation of synergy among resources through internal management, thus generating positive X efficiency.

Moreover，there is imbalance of scale effect in the incubator of Zhejiang province. Start with the scale effect of the incubator at present, that is, the state of scale return and the level of incubating-efficiency, then we can make a judgment through the scale elasticity of DMU. If the front edge of CRS and VRS is set in the same coordinate system, the scale change level of DMU can be clearly judged. The judgment principle of RTS is shown in figure 4.2 6. In the figure, ray OC (dotted line) and broken line MACD (solid line) represent the front line of CRS and VRS respectively. Points B and C coincide in front of CRS and VRS respectively, that is, it become reference points for other DMU efficiency. The projections of B, C and G are all in CRS state. If the projection points of A and F are below B, the $\sum \lambda \langle 1$ is in the state of IRS; If the projection points of D and E are below C, the $\sum \lambda >1$ is in the state of DRS. Combining with the measurement result of each DMU analysis, no SE $\langle 1$ and $\sum \lambda^* \rangle 1$, the incubator incubating-efficiency of Zhejiang province are currently in TRS increasing or steady state, and no state of DRS.
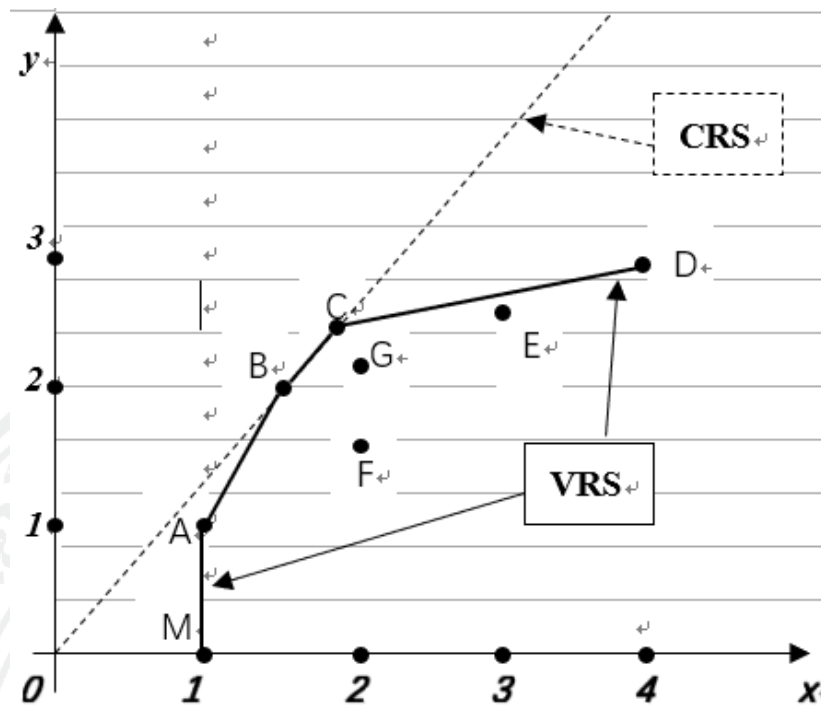
Figure 4.2 6 The Demonstration of Evaluation Principle of RTS

If a DMU is in the stages of RTS, the change of one variable will cause the change of another variable. The ratio of the dependent variable to the independent variable is the elasticity of the dependent variable to the independent variable, namely E=MP/AP. In input orientation, the amount of change in input (the proportion of increase or decrease) is obtained when the output is controlled slightly (the equal proportion increases or decreases). By calculating the marginal output and average output of the projection point, the scale elasticity E of DMU can be calculated in the Multiplier Model. The interval value (upper limit and lower limit) of scale elasticity is obtained by solving the equation. The linear programming for the specific solution is shown in Formula (5). The specific Scale Elasticity interval value of each DMU in the Multiplier Model is shown in Table4.2.2 (6).

$$\text{Multiplier Model} \atop (\text{Input-oriented})\left[\begin{array}{l} MP = \dfrac{d_y}{d_x} = 1 \\[2mm] AP = \dfrac{\sum_{r=1}^{q} \mu_r y_{rk}}{\sum_{i=1}^{m} v_i \theta_k^* x_{ik}} = \dfrac{\sum_{i=1}^{m} v_i \theta_k^* x_{ik} + \mu_{ok}}{\sum_{i=1}^{m} v_i \theta_k^* x_{ik}} = 1 + \mu_{ok} \\[3mm] E = \dfrac{MP}{AP} = \dfrac{1}{1 + \mu_{OK}} \end{array} \right.$$

$$\min(\max) \mu_0$$

$$\text{s.t.} \sum_{r=1}^{q} \mu_r y_{rj} - \sum_{i=1}^{m} v_i \theta_j^* x_{ij} - \mu_0 \leq 0$$

$$\sum_{r=1}^{q} v_i \theta_k^* x_{ik} = 1$$

$$v \geq 0; \mu \geq 0; \mu_0 \ free$$

$$i = 1,2,\dots,m; r = 1,2,\dots,q; j = 1,2,\dots,n;$$
$$E_{max} = 1 - \mu_0^*, min$$
$$E_{min} = 1 - \mu_0^*, max$$

Formula（5）

Finally, HAC analysis based on the comprehensive DEA calculation results shows that all measured DMUs of Zhejiang incubator can be divided into two categories. Due to the relatively significant differences between BI15 and other DMUs clustering groups, it indicates that other samples have greater variability compared with other samples, so it is classified into a separate category. For BI1 and BI7, there is certain significance between the groups, but the performance is not outstanding, and the differences of the few indicators can be ignored, so they can be separately merged into a small group in their major categories. Combined with the Hybrid Model, it can be found that the difference of incubating-efficiency between various incubators is mainly caused by CE and AE. Given that the relationship between AE, CE and TE is AE=CE/TE, it can be clearly seen that the improvement of incubating-efficiency should be focused on the improvement of CE efficiency, that is, the main factor affecting the incubating-efficiency is CE. The efficiency values of AE, CE, TE, SE and PTE of DMUs were plotted as radar graphs (all the efficiency values of other DMUs were compared with BI15 as the reference benchmark, and the corresponding characteristics of each DMUs' efficiency were plotted). The efficiency characteristics of each DMU

can be clearly seen. Compared with other DMUs, each efficiency value of BI15 has advantages. The comparison of characteristics of each DMU is shown in figure 4.2 7.
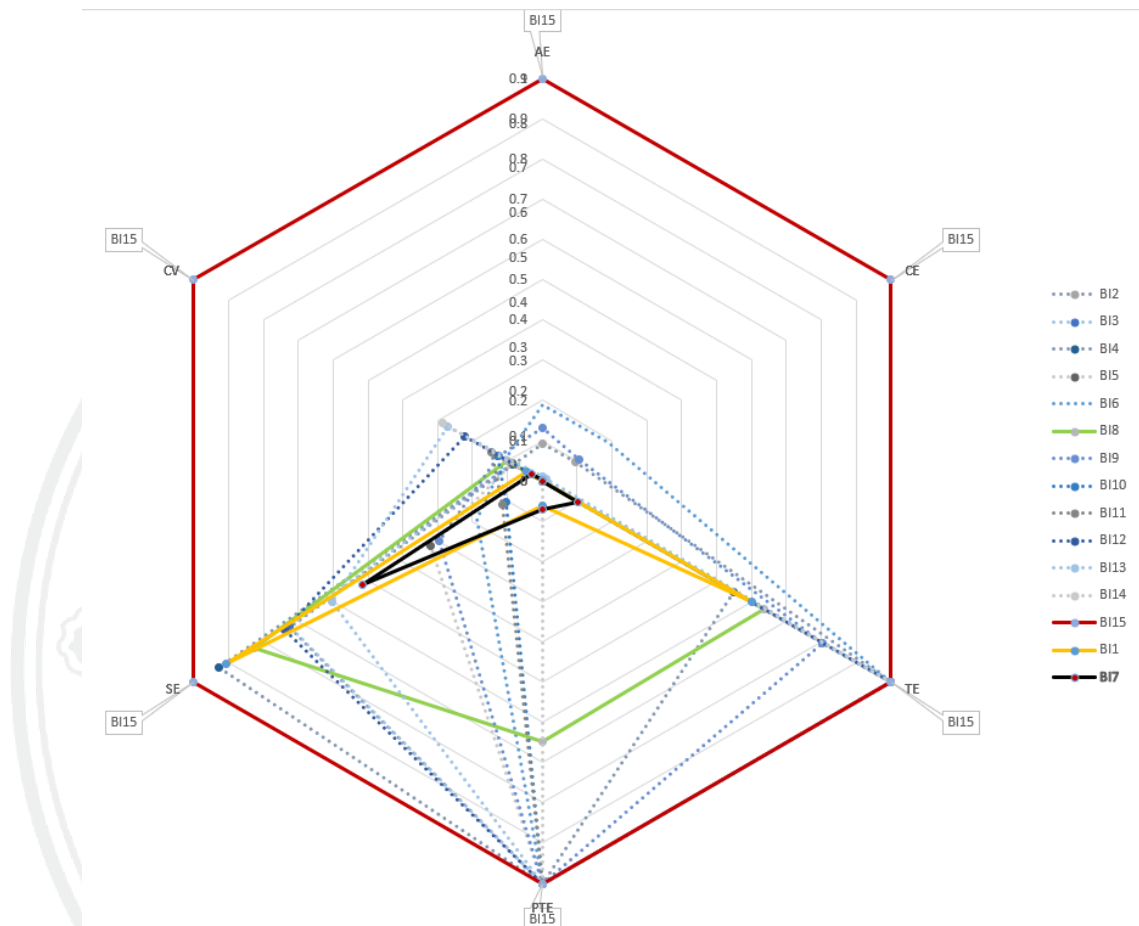

Figure 4.2 7 The Radar Chart of DMUs' Characteristics from DEA & HAC

4.2.4　Qualitative research on incubating-efficiency based on interview

As for the research on incubator efficiency, this paper not only uses DEA model to start with quantitative analysis, but also conducts field research on the operation and management of the incubator. Through in-depth interviews with relevant stakeholders of the incubator, this paper further clarified the incubation status of the incubator in Zhejiang province, and verified the role of indicators in the DEA model that had an impact on the incubating-efficiency in the actual operation of the incubator, and the hypothesis of the impact on the incubating-efficiency. From the perspective of

qualitative research, this paper reviews the incubator status of Zhejiang province and the improvement path of its incubating-efficiency.

In-depth Interview

The researchers conducted 22 in-depth interviews with incubator's managers, N.E. managers, researchers and Supervisor from administration department of Government, by face-to-face, all of who were drawn from six cities: Hangzhou, Ningbo, Jiaxing, Jinhua, Hongkong, Tianjin. Table 4.2 14 illustrates the respondents in this research of interview. However, a random survey has been taken with the in-depth interview.

Table 4.2 14 The Summery of Respondents in Interview

ITEM	%	NAME	POSITION	UNIT
Gender		Q. X. Kong	Manager	NYYCEP
Male	82	Z. Zhang	Entrepreneur	NYYCEP
Female	18	C. L. Zhao	Manager	YGMP
Years in Work		Z. H. Ying	Entrepreneur	YGMP
1-2	9.1	B. Liu	Manager	YBIDA
3-5	49.99	L. Liu	Entrepreneur	YBIDA
5 or more	40.91	Y. Shi	Manager	iNCUBATOR
Job Level		Z. F. Xu	Entrepreneur	iNCUBATOR
Entrepreneur	78.16	Y. P. Zhang	Manager	LFZHP
Supervisor	8.2	Eunice	Entrepreneur	LFZHP
Investigation/Research	13.64	X. X. Tang	Manager	HZHIP
Job Function		X. B. Xia	Entrepreneur	HZHIP
Support Services	40.91	H. F. Luo	Manager	NHST
Supervising	8.2	G. Chen	Entrepreneur	NHST
Teaching/Research	13.64	B. Zhu	Manager	JXSTI
Others	37.25	X. Xiao	Entrepreneur	JXSTI
Educational Level		F. Xu	Manager	JHSPI
High school or less	9.1	Y. W. Zhou	Entrepreneur	JHSPI
Diploma	13.64	X. T. Xia	Administrator	ZSTIA
Bachelor's degree	45.45	Eric	Researcher	HKPU
Master's degree	22.73	X. L. Tang	Researcher	DHYU
Doctor/Ph.D./Prof.	18.18	J. Qin	Researcher	NKU

The Key Opinions of In-depth Interview

The In-depth interview program is shown as Appendix I. The key results were found from in-depth interviews; the meaning was considerable as the previous research.

During the interview these members of researchers and experts focusing the field of incubators and entrepreneurship co-incited that the incubator needs to solve the problem of resource allocation and incubating-efficiency. At the present stage, the distribution of incubation resources in Zhejiang province is consistent with the development stage of the incubator. In addition, it is proposed that the incubator needs to evaluate the NE development stage and provide corresponding incubation resources targeted support, to improve the incubating-efficiency of the existing incubator. They stated in the interview as follows:

"Eric said that regardless of the standard development of the entrepreneurial environment or from the perspective of social employment, the government should issue corresponding policies to guarantee the fair operation of the incubator. He repeatedly stressed that incubators need to compete fairly in the market environment, eliminate less efficient incubators, form hatching resource platforms with brand or demonstration effect, and form the circulation network of incubation resources. He also stressed the importance of the professionalization of the incubator and said that if the incubator can classify the incubation resources according to the characteristics of the development stage of NE and provide the key resources required by each stage of NE, the overall incubating-efficiency of the incubator can be effectively improved. X.L.Tang said that at present, the incubator in Zhejiang province is in the stage of repeated construction, which is caused by the different introduction time and intensity of entrepreneurship policies caused by different entrepreneurial development levels in cities in Zhejiang province, resulting in the time gap between the operation and development of the incubator. However, the post-development area is a model of the development of the incubator and the idea of the development of the region, which leads to the waste of type of repetition and resources. Therefore, at present, there is no specialized incubator with vertical allocation of resources in the incubator in Zhejiang province, nor is there much communication and cooperation between the incubators. This is also the reason why the overall incubating-efficiency of Zhejiang incubator is not high. In addition, she also proposed that the foundation and premise for the

incubator to develop in a professional direction is to make a more accurate judgment on the incubation of NE or teams, and to help NE to find the stage of development. Only in this way can the incubation resources be allocated effectively, and the overall incubating-efficiency is improved. J.Qin pointed out that the incubator in Zhejiang province is still too dependent on government or public sector subsidies, and its own profitability is not strong. From the perspective of entrepreneurship, incubator is the infrastructure of entrepreneurship development, and it is also the main body of entrepreneurship. The incubator must break through the mode of relying on financial subsidies to increase operational income, such as various enterprise agent service business, talent business, and financial business, to improve the incubating-efficiency of the incubator for NE. He also said that guidance and management for NE is not the key work all incubators must do. The incubator should give targeted help according to the characteristics of the industry and its own advantages in combination with the development stage of NE. For example, the NE has passed the initial stage, and at this time, it is more necessary to pay attention to the management and service of the market segment of the NE. For now most incubators focus too much on NE revenue, J.Qin thinks it's unnecessary. He pointed out that the business income of NE in the incubator does not indicate the profitability of the enterprise, nor can the incubation capacity and efficiency of the incubator be judged from the NE income alone. The concern of incubating-efficiency is reflected in the targeted allocation, effective utilization and sustainable development of incubation resources of NE. This is different from the mature enterprises outside the incubator. From the perspective of the business process of incubator, seemed to lack the standard requirement of the exit, in Zhejiang province are most of the incubator for NE to enter certain examination or review, but for graduation or exit is not restricted to specific standards, which makes the NE growth to reach level or incubator graduate quality are difficult to compare or quantitative. It also brings difficulties for NE to develop independently after they exit the incubator. The biggest challenge is the fuzzy development path and the lack of strategic planning for NE (Eric & X.L.Tang & J.Qin,March 2018).＂

These results incited with supporting policy and the construction of a competitive market environment and so on. From X.T.Xia, who is an officer of administration agent of incubator and entrepreneurship. He stated as follows during the interview:

"Policy support is critical to the incubator industry. Good policies can promote the development of the incubator industry, but inappropriate policies can also be the bottleneck of the development of the incubator industry. From the support policies of Zhejiang province for entrepreneurship and incubator construction, the current support mainly focuses on tax and direct financial subsidies, and there is no professional industry-leading support policy, nor is there any incubator support policy for regional industrial upgrading. As the policy is mostly at the macro level, it also brings inconvenience to the incubator management departments in actual operation. In the end, they can only simply implement tax and direct economic subsidies. Such policy implementation will promote the duplication construction of regional energy incubators, including the types of incubators and industries that support the development of NE. As a result, the market allocation of resources is ineffective or unable to form complementarity, which leads to the lack of synergy in the allocation process of hatching resources. Therefore, the incubator efficiency of Zhejiang province generally has room for improvement. Furthermore, he said the government should provide more human resource policy support and transparency of resource information such as talent, science and technology and government affairs. The allocation of incubation resources mainly relies on policy guidance and market competition and no longer emphasizes the control of property rights or the subsidy of direct funds. This is also to reflect the survival of the incubator and improve the incubating-efficiency, which requires the government to change the management philosophy and method. Finally, he said that the government is more concerned about whether the incubator can better improve the employment rate in the region, especially to solve the employment of graduates. In the next phase, the government will pay more attention to the professionalism of the incubator; this professionalism includes the structure and level of the incubation service professionals, the industry focusses of the incubator and its positioning in the industry value chain, and the incubation resources that match the industry of interest. Configure concentration. It is also hoped that the incubators in various regions will form a large incubator network with complementary advantages, and the incubators in the region can develop in dislocation and strengthen cooperation. Government authorities act as coordinators of information, resources, talent, and

technology exchanges in incubating network relationships, rather than poverty alleviation of individual incubators."

To the result mentioned around the supporting of operation and management during the incubating period. Interviewees, who are all from the N.E. or the operator of incubators, stated as follows:

"The main profit point of the current incubator is still from the traditional rent and government subsidies. In recent years, the income from additional services such as talent introduction and project declaration has begun to increase. The increase in these additional services is also dependent on the government's guidance and entrepreneurial activities. Incubator managers have expressed the need to strengthen technology services on the current basis, expand external market links, and strengthen cooperation with other organizations to form a gradient incubation industry chain. Some incubator managers said that they need a lot of resources to invest in talent introduction and scientific and technological achievements, but they should be controlled in hardware facilities such as space. Incubator managers feel that there is a lack of professional entrepreneurial management talent resources, and mature patent conversion and application support services are still lacking. Although the current incubator can obtain relatively stable and sustained government subsidy income, this part of the income has become a fund for maintaining the operation of the incubator itself, and can no longer be invested in the cultivation of NE. The ability to connect to the external venture capital market is an urgent bottleneck for the incubator. They also said that when the NE industry category fostered by the incubator is more concentrated, the easier it is to build and configure their entrepreneurial resources, which means that the incubating-efficiency will be higher. If there are the same industry incubators in the region, but between the different incubators have the resources focus is different. Through cooperation and communication, it can also promote the rapid growth of NE. The incubator's ability to evaluate the accurate positioning of the NE's development stage is conducive to the later management convenience and will also help to provide targeted incubation resources. This aspect is also the consensus reached by the Zhejiang incubator industry."

"The entrepreneurs in the incubator generally feel that the administrative color of the incubator is strong at present, the market competition is insufficient, and the allocation efficiency of the overall incubation resources is not high. They said that incubators are more supportive in taxation and hardware facilities and that start-up funds such as small interest-free loans are more convenient and provide a lot of basic business services. However, the continued support for the growth of NE is not enough. Many incubators lack professional entrepreneurial instructors to provide professional advice on the development of NE. Moreover, the NE categories in the incubator have different differences or homogeneity, and they do not form an effective internal collaborative environment, and even compete with the same platform and resources. The NE in the incubator are not closely connected with each other and have not formed a good communication channel. This also exposes the current lack of capacity for the construction of the incubator environment in Zhejiang incubators. However, incubator managers and governments are more concerned about the business income and jobs provided by NE, and have less support for NE development strategies, talents and market channels. Although there are some specific industry-oriented incubators in Zhejiang province, overall, they are still large and comprehensive, and they do not make good use of the industry advantages. What NE need most is the financial resource support in the market development stage and the talent resource support in the research and development stage. It is also hoped that the incubator can simplify the cycle and process of project approval, entrepreneurship guidance, investment and financing, and improve the efficiency of NE in utilizing the incubator resources. NE operators also say that if incubators can build a stable professional incubation environment and support incubation at different stages as their businesses grow, it will have better results and the graduation cycle of NE will speed up. It is also hoped that the direct involvement of industry resources will form a controllable difference in the environment of the incubator. When new businesses choose an incubator, they are more concerned about whether it can provide strong financial support. At the same time, it is also hoped that there will be more cooperation between the incubator and the industry so that NE can integrate into the large resource network through the incubator as the window of resource link. If the incubator can provide a personalized customized solution, mainly

based on the development needs of the NE, and the step-by-step resource package selection will attract more high-quality NE.〞

In additionally, common opinions stated with interviewees as follows:

〝At present, the incubator does not form a transparent and standardized business operation norm for the entry threshold of NE; the incubator does not make a suitable assessment for the development level of NE; the financial support services for NE are not active, most the situation is that the NE actively proposes the passive organization review of the incubator after the application; for the talent support, which is mostly the regular cooperation policy, there are few human resource solutions for the needs of the NE. These problems can cause the inside of the incubating environment is unstable, difficult to reflect the fairness or effectiveness of resource allocation, making NE growth slow, the incubation period is longer. This is also the reason why the overall incubator efficiency of incubators in Zhejiang Province needs to be improved. In addition, within the incubation network composed of the same incubator or multiple incubators, the more the number of NE, the more diverse the development stages of NE, the greater the value of incubation and the overall utilization of resources.〞

Generalizing the In-depth interview as above context by KJ

Through the association of interview materials, research hypotheses, related content, opinions, suggestions and ideas of incubation a factor, the KJ method is used to classify and merge, and the factors affecting incubating-efficiency and the direction of improvement are analyzed. The standard operation procedure is as follows:

1. Keyword extraction of interview materials；
2. Material content is similarly classified；
3. Combine the hypothesis with sorting the classified content according to the problem to be solved；
4. Recombination of materials and problems according to research design goals, and re-compare the original materials for additional explanation；
5. Obtain key information and summarize the desired results；

In the summary of the interview content, to make the expression clearer, the main body of the incubation activity will be combined, that is, the operation manager of the

incubator and the NE operation management personnel are collectively called the Incubating Activities Direct Participants.

Table 4.2 15 Generalizing Findings of In-depth Interview by KJ

DIMENSION	ROLE		
	Administrator	Incubating Activities Direct Participant	Researcher
		In-depth Interview's Opinion Aggregation By KJ	
Input	Strengthening resources investment in talent, technology, information and government services;	To increase the capacity of financial services and technology services, to take control of the premises and to the hardware facility; Enhance the transparency of the evaluation of N.E., and implement the dynamic evaluation of the whole process in the entry, incubation, graduation, exit, etc. At the initial stage of entrepreneurship, N.E. hope that the E.I. can directly participate in the operation, that is, become a partner and help the N.E. build a stable management team.	It is necessary for that government to plan the area and the industrial distribution reasonably in the construction of incubator, so as to avoid duplication of construction and vicious competition due to policy;
Process	To Improve incubating-efficiency through market competition;	Traditional property income and government subsidies are the main sources of income; Additional income such as the introduction of high-end talents, high-tech projects, and filings has become a new profit point; Configuring different resources according to the stage of N.E. development can effectively improve the efficiency of incubating; The incubator urgently needs to increase the number of professional operations personnel and E.I., and improve the professional skills of existing staff; Strengthen the capabilities of financial services and technology services, and control the investment of hardware facilities such as venues; Simplify unnecessary staff, improve the efficiency of the per capita in-service of incubators, and increase the number and quality of E.I.; Reducing low-quality entrepreneurial activities and formal liaison meetings, introducing high-end professional venture capital institutions; For N.E. in the development stage, it is hoped that the incubator can provide more market opportunities and industrial channels, and E.I. can help N.E. to integrate into the competitive market environment; For newly graduated companies, they hope that the incubator can provide more opportunities for contact with PE or VC. The E.I. can effectively design and manage their finances and provide advice on IPO or capital market operations;	Incubators conduct stable and continuous evaluation on the development of N.E.;
Output	Change assessment criteria —— Besides social benefits, economic benefits should also be strengthened;	The N.E. hopes that the incubator will continue to provide relationship information after graduation, and build industrial support and cooperation channels among N.E.;	Pay attention to nurturing behaviors and sustained entrepreneurial activity;
Environment & Innovation	The diversity of policy support; Linkage between regions and social-organizations to form incubation and information network;	Strengthen the incubator's specialization and industrial concentration; All parties have strong intentions to strengthen cooperation between incubators; It is hoped that the government will play a good role of coordinator, strengthen industrial guidance and improve the market environment, and reduce administrative interference in the operation of the incubator. In the park construction and function planning, avoid the repeated construction or the bad competition between the incubator due to the unreasonable policy design; It is hoped that the government will change the funding method for incubators and avoid the incubators from defrauding subsidies and diluting limited incubation resources. If the incubator can separate out the basic business services, focus on the allocation of resources in the professional field, and raise the threshold for N.E. to enter the incubator, it will effectively improve the incubation efficiency. N.E. are not concerned about the nature of property rights or funding sources of incubators, nor will they affect the choice of new companies. That is, irrespective of the property of the incubator and the source of funds, the N.E. only pays attention to whether it can more easily obtain the necessary resources and services from the incubator; Incubators should take the initiative to strengthen cooperation with regional financial institutions and expand access to quality N.E.;	Create a fair business environment; Directional support for incubators; Prevent systemic risks arising from policies; To build a new type of incubating mechanism;

Overlapping Consensus

Admission Criteria, Dynamic Assessment: Concerned about the process of new enterprise growth, do a good job in assessing the entry and exit of new companies, and adjust the service approach.

Financial services: Actively help new enterprises obtain the necessary financial support, including PE or VC, industry-specific funds, government support funds; joint financial institutions, design targeted innovative financial products to ensure that new companies in the development process of funding needs.

Pay attention to HRM: The development of HR should be placed first in the incubator's operation and management, mainly including the establishment of the incubator's own professional team and the provision of HR support for the development of N.E.

Internal Incubating Environment Construction: The allocation and service content of incubation resources should be fair, transparent and standardized, create a reasonable and orderly competition within the incubator, and promote the flow of resources and cooperation among new enterprises within the incubator.

External incubating network construction: Strengthen the cooperation between incubators, incubators and other organizations, form a large incubation network, and break the barriers to circulation of new enterprises and incubation resources in different regions or between different incubators.

4.3   Discussion of the Research Findings

The findings were found from the DEA model and In-depth interview survey as table 4.3 1. And the author's comments will be presents in the discussion.

Table 4.3 1 The Comprehensive Results of Findings

The Essential Issue	Measure Dimensions	Hypotheses	DEA	H-Testing	Key Findings
Relationship between the input resources degree and incubating-efficiency	Incubating ability	H2：The ability of the incubator to determine the orientation and level of N.E. in the development stage will have a positive impact on the incubating-efficiency.	D3-i5 E.I.F.S. External investment and financing support	+	It will be helpful to improve the incubating-efficiency of the incubator to give accurate development orientation and evaluation before the N.E. enters the incubator and provide targeted entrepreneurship guidance service; It focuses on the process of incubation, and the dynamic sustainability management of the whole supporting and service for N.E. is a way to improve the incubating-efficiency of the incubation process; The construction of scientific and technological resources and HR should be strengthened to improve the incubating-efficiency of the incubator; The stability of the incubator's internal small environment (including new enterprise employees, finance, management policies, industrial direction, entrepreneurial culture, etc.) and the industrial category and number of N.E. have a positive impact on the incubating-efficiency; The N.E. does not focus on the property rights of the incubator, but only on whether it can obtain sustainable and stable resources supporting from the incubator; The business revenue of the N.E. cannot reflect the incubating-efficiency of the incubator. N.E. should focus more on innovation in their business models and the stability of their management teams than on purely financial target; The professional construction of incubators (cultivation industry, concentration of resources, quality and quantity of entrepreneurship advisors, selection of industry field of N.E., evaluation of the development phase of N.E., etc.) and hierarchical service for the N.E. cultivation have a positive impact on the incubation efficiency; The new incubation model, which is Public incubation platform combined with professional incubator, helps to form regional incubation network, which can make the incubation resources more concentrated, accelerate the communication of information and talents, reduce the management cost, and improve the incubation efficiency of a region as a whole; A regional entrepreneurship policy stability and professional PE, VC quantity, will affect the incubating-efficiency of incubators;
		H3：The management intensity of the N.E. cultivation process will have a positive influence on the incubating-efficiency.	D2-i3 P.C.S.I.E. The per capita of service of incubator employee for N.E.	+	
		H4：Knowledge resources and service-oriented resources have positive effects on the improvement of incubating-efficiency.	D2-i4 E.I. Entrepreneurship instructors D1-i1 I.S. Incubation space	+	
	Incubating environment	H5：The incubating-efficiency of the incubator is related to the source of funds and property rights.	D1-i2 I.F. Incubation funds		
The influence of property right and capital source of incubator on incubating-efficiency			D3-i5 E.I.F.S. External investment and financing support	−	
		H7：N.E. turnover can reflect the incubating-efficiency of incubators.	D4-o2 T.I.I. Total income of incubator	−	
The operation of the incubator sustainability	Incubating synergy	H1：The synergistic ability of the incubator to resources in the process of N.E. cultivation has a positive influence on the incubating-efficiency.	N/A	+	
		H6：Hierarchical incubation resources and resources network connection degree has a positive effect on incubating-efficiency.		+	
		H8：Incubating-environment stability of incubator structure has a positive effect on hatch efficiency.		+	
		N/A	D4-o1 T.N.E. Total number of employees	N/A	

Notes：+ Positive / Influence   − Negative / Deficiency   − + Conditional Effects / Weak-positive

According to previous sections of research and findings can induce the relationship discussions as follow.

The discussion of findings as environment factor

The environmental factors on which the development of the incubator depends can be divided into internal and external; at the same time; it can also be analyzed from the aspects of policy, market, internal cultivation and external network. However, there are strong links and intersections in all aspects, not independent of each other. Therefore, this article will discuss the incubation environment factors of the incubator from the perspective of the regulator.

First, for the government, the subject of regulation, at the macro market level, the government should create a business environment with transparent laws and regulations and let the incubators participate in fair competition. With the adjustment of the market to the allocation of resources, high-quality incubation resources will be concentrated in more efficient incubators, so that mergers and reorganizations will occur between the incubators, and less efficient incubators will be eliminated, to improve the efficiency of regional resource allocation and improve the incubating-efficiency of the incubators.

Second, in terms of supportive policies for incubator development, government authorities need to act as a good coordinator, rather than conducting poverty-alleviation control on individual incubators. At the current stage of the development of incubator industry in Zhejiang province, the government should provide more information resources in the fields of talent, science and technology, government affairs, law and finance, and avoid extensive property rights control or direct tax subsidy. Further transform the function and mode of supervision and become the basic service provider and policy firewall for the incubation industry development.

Thirdly, policy orientation is an important factor to promote the rapid development of an industry. Inappropriate policy guidance will cause the incubator industry to fall into the bottleneck of development, resulting in repeated construction and dilution of important resources. Therefore, the government should combine the regional resource structure and industrial planning to pay attention to the professional construction of the incubator, which includes the structure and level of the incubator service professionals, the focus of the incubator itself and it is positioning in the industrial value chain, as well

as the concentration degree of the incubator resource allocation that matches the industry concerned.

In addition, as for the incubator operators, they would like to separate the basic services such as business registration, license representative and financial personnel agent from the operation and submit them to the specialized basic incubation platform for centralized processing. And its resources to focus on science and technology service, professional knowledge training, financial innovation and help NE and the external market docking, create their own unique brand image, and by strengthening the multilateral cooperation to build a network of external resources, including incubator and incubator, governments, universities, enterprises, investment institutions, industry associations and other groups formed by the link. This external network is not only an important source of incubation resources, but also the basis of establishing a layered incubation system.

Finally, it is necessary to guard against the emergence of systemic risk in environmental factors due to supportive policies and incubator management capabilities. From the internal and external environment of the incubator, if there is no effective incentive mechanism and elimination mechanism for incubator supervision and new enterprise cultivation, then more incubators will meet the regulatory requirements to obtain continuous support policies and subsidies. Requirements, which led to the false prosperity of the entire industry, but this has squeezed the opportunity for high-quality organizations to obtain resources, undermining the synergy benefits of the incubation network, leading to the withdrawal of the head incubator companies, and eventually forming a systematic system in the region. Reverse phase-out mechanism. To this end, government regulators and incubator managers should strengthen the introduction of external venture capital institutions, appropriately limit public investment (government support funds), increase the incubating-efficiency through competition, and prevent systemic risks of "reverse elimination mechanism".

The discussion of findings as incubating ability

The strengths and weaknesses of incubation resources are a direct manifestation of the incubator's ability to incubate. The construction of incubators in Zhejiang Province should focus on the utilization of resource stocks, focus on the introduction of professional resources based on scale of control, and strengthen the links between

various organizations to form an effective network of incubation resources and increase the capability of incubation. Among them, the channel construction of professional venture capital and the recruitment of high-level talents is the most important factor in the construction of many incubation resources, which is also an important reason for many NE to choose to settle. Judging from the current level of talent service in Zhejiang incubators, it is more conventional to cooperate with the implementation of government policies, and there are few services that provide human resource solutions for the needs of NE.

The quality assessment of the new enterprise itself is an important means for the incubator to improve the quality of the NE, which will directly affect the efficiency of the incubation. If the NE itself is not competitive enough, the resource utilization capacity of the incubator will be insufficient, increasing the cultivation cost of the incubator. When the incubator can accurately assess the development needs of NE, invest in resources that are comparable to the growth level of NE in stages, and improve the incubating-efficiency. For example, for NE in the mid-incubation period, incubators need to pay more attention to their market operations and product services, helping NE to scale up and reduce costs.

In addition, incubating ability is also reflected in the structure of the internal environment and entrepreneurship education for NE. Effective entrepreneurship education and a stable small environment can prevent NE from being disgusted by other mature companies at the beginning of their establishment, helping NE to survive the most vulnerable infancy and promote the rapid growth of NE. At the same time, good internal environment will also generate new inter-enterprise contacts to form network synergies of resource allocation within the incubator, to further enhance the value of the unit of resources. The orderly management of the incubation environment and entrepreneurship education for NE is an important responsibility of entrepreneurial tutors. Therefore, the incubator's ability to incubate depends to a large extent on the strengths and weaknesses of the entrepreneurial tutor resources.

Finally, the strength of the incubator is also reflected in the attractiveness of the incubator to the client, that is, the ability to obtain quality NE. The cultivation of NE is the fundamental value of the existence of incubators. The output of incubators is based on the output of NE. The allocation capacity and incubating-efficiency of incubator

incubation resources are also reflected by the growth of NE. Therefore, modern incubators should pay attention to the introduction of new enterprises while doing a good job in resource construction. Through the development of its own brand building and market activities, we will try to expand the number of high-quality NE and pay attention to the distribution of NE industrial structure. This is also the basis for the incubator to be able to specialize.

The discussion of findings as output factor

The incubating-efficiency will be expressed by the output of the incubator. For an incubator that is a profit-making organization that participates in market competition and is also a policy-adjusting tool, its output depends not only on economic benefits but also on social contributions.

At present, the supervision and evaluation of incubators in Zhejiang Province overemphasizes the tax revenue and turnover generated by NE. It is not reasonable for process cultivation and industrial guidance. This is unreasonable. This paper believes that when judging the efficiency of an incubator, it should pay more attention to the contribution of its society, such as the employment impact of the region and the leading ability of industrial development. The object of the incubator service is the NE. The NE is different from the mature enterprise and is not competitive in terms of operational stability and profitability. However, the government can implement corresponding economic policies through incubators, guide NE to carry out industrial layout, optimize industrial structure, and improve employment. More importantly, it can form a highland of talents, capital, technology, and information, so that relevant industry resources can gather and radiate around the incubator. This has extremely important social value for the sustainable development of a region.

From the results of model calculation and discussion and analysis, there is still much room for improvement in the overall incubating-efficiency of incubators in Zhejiang Province, especially the scale efficiency is low. In addition, the survey also validated the research hypothesis, and confirmed the path of incubator efficiency improvement based on literature theory and hypothesis and the feasibility of constructing a new efficient incubation model.

CHAPTER 5
CONCLUSION

This chapter presents a conclusion of the study which based on the data presented, analyzed and interpreted. In addition, the chapter presents a policy recommendations and ideas for further research.

5.1   Overall Research Overview

This paper conducts in-depth interviews with relevant personnel through a sample survey of entrepreneurial incubators, incubators, and incubating-efficiency. The various methods of sample incubator were measured, compared and analyzed using a hybrid research method combining qualitative and quantitative methods. And try to build a new layered incubation system through the clustering characteristics of incubating-efficiency and the adjustment of the incubator operation mode to improvement incubating-efficiency of the existing incubator.

The focus of the research process is on the incubator category, the main influencing factors of the incubation of the business, and the effectiveness level of the incubating-efficiency. Based on the incubating-efficiency value study and in-depth interview research of the sample incubator, the hypothesis of the influencing factors of the incubating-efficiency is verified. Corresponding to the research purpose, the strategy of improving the efficiency of the incubator and the new layered incubation system model are proposed.

The research on incubating-efficiency of incubators has great historical significance for China in economic transformation and has important social value for meeting regional economic growth and promoting technological innovation. The importance of incubating-efficiency is reflected in the sustainable and stable development of society, mainly in solving regional employment problems and improving innovation capacity. Employment and innovation are the driving force for regional economic development and the embodiment of regional competitiveness. This again shows that research in the field of incubation efficiency will have far-reaching significance for the development of the incubator industry and will become the mainstream in this field. The research in this area can accumulate preliminary research

experience in the future breakthrough research results in the field of incubators. Which combined with the new tiered system incubator concepts and models proposed by the Institute of Chapter III was at this stage incubator incubating-efficiency optimization practice to provide a theoretical support.

Any mechanism innovation process must contain a breakthrough in the original system, the birth of a new model must be the result of grafting or reform the old system, and in line with the development of industry trends. The market requires enterprises to improve the efficiency of their own resource allocation, so as to compete in a fair environment, has reached the Pareto optimality of social resource allocation. This paper studies the improvement of incubating-efficiency, which is in line with the identity of the incubator as a market participant and the social interest of regional development. Through the sampling survey and research on the incubator in Zhejiang, the most mature economic development in China, it provides practical evidence for the optimization strategy of incubator incubating-efficiency and provides a theoretical basis for the innovation of incubation model.

5.2 Signification Findings and Consequence

For the incubator, it is necessary to assume the social responsibility of the policy tool as the regional business foundation, but also to reflect its own business value. No matter how the external environment changes, it has the commonality of social responsibility and sustainable development needs, which also leads to Different incubators have the same incubating-efficiency attributes and similar influencing factors. Based on the cluster analysis of DEA calculation results of sample incubator, this paper classified and combined the difference of incubating-efficiency and influencing factors of incubator in Zhejiang province, further discussed the influencing factors of incubating-efficiency of sample incubator through in-depth interviews and verified the research hypothesis of this paper.

This paper finds that the incubator in Zhejiang province has a positive effect on promoting regional employment. The incubation of the incubator for the NE is roughly the regional economy. It also incorporates the economic base of Zhejiang province, the ability to innovate, the level of education, the structure of the resources, the basic needs of the region's employment, finance, and industry upgrades. From the distribution of

the incubation capacity, there is a problem with the imbalance, which is that the incubation of ability to attract NE, there are very large differences in the inner regions of Zhejiang province. Considering that the operation fund sources of the incubators in Zhejiang province are relatively single, mainly from the subsidies of the government or public institutions, the concentration density of regional incubators and NE supported by policy funds is obviously high. Such a single source of funding also makes the incubator subject to certain administrative interference, and its operation loses the significance of market competition, resulting in increased operation management and supervision costs, decreased incubating-efficiency and NE guidance, and greater room for improvement in incubating-efficiency. In addition, the policy support mode of capital subsidy also hinders the generation of competitive impetus, making the overall improvement of the incubating-efficiency in the region more and more difficult, and gradually forming the anti-elimination mechanism. These defects are the side effects of supporting policies, hindering the free circulation of incubation resources and the process of the complete marketization reform of the incubator industry. The incubating-efficiency can neither be optimized well nor be generated by industrial synergy. At the same time, the immature market environment makes the incubator industry with systematic risks and hinders the independent generation of competition and cooperation between the incubators, which makes it difficult to build the incubation network system, and it is also difficult to have an efficient X-efficiency within. The policy change is the key to break the bottleneck of incubating-efficiency optimization. It is also the prerequisite for establishing a fair and orderly competition environment and the best way to avoid systemic risks.

As a region with developed private economy and high marketization degree in China, Zhejiang province can reflect the status quo of China's incubator industry development, the difficulties to be overcome in optimizing the incubating-efficiency and the ideas to improve the incubating-efficiency. The innovation of incubator model in Zhejiang province provides practical basis and theoretical support for Chinese incubator to improve incubating-efficiency. Through the whole hierarchical incubation and efficiency improvement model system proposed in this study, the existing entrepreneurial resource allocation mechanism can be optimized, current incubation support policies can be improved, the systematic risks generated by policy guidance of

the incubator industry can be reduced, and the overall incubating-efficiency of a region can be improved. At the same time, the design of the new layered incubation and efficiency improvement model has been confirmed by the industry and professional researchers in the qualitative research. Combined with the purpose of this study, through qualitative and quantitative analysis, the research conclusions are summarized, as shown in Table 5.2 1.

Table 5.2 1 Signification Findings and Consequence

Outcome	Environment Factors	The Linking and Operating Capability of Incubator	The Incubating-efficiency and Synergy
Hypothesis	H4：Knowledge resources and service-oriented resources have positive effects on the improvement of incubating-efficiency. (+P) H5：The incubating-efficiency of the incubator is related to the source of funds and property rights. (–N)	H2：The ability of the incubator to determine the orientation and level of N.E. in the development stage will have a positive impact on the incubating-efficiency. (+P) H3：The management intensity of the N.E. cultivation process will have a positive influence on the incubating-efficiency. (+–C) H4：Knowledge resources and service-oriented resources have positive effects on the improvement of incubating-efficiency. (+P)	H1：The synergistic ability of the incubator to resources in the process of N.E. cultivation has a positive influence on the incubating-efficiency. (+P) H5：The incubating-efficiency of the incubator is related to the source of funds and property rights. (–N) H6：Hierarchical incubation resources and resources network connection degree has a positive effect on

			incubating-efficiency. (+P)

H7：N.E. turnover can reflect the incubating-efficiency of incubators. (+P)

H8：Incubating-environment stability of incubator structure has a positive effect on hatch efficiency. (+P)

Key Findings	The soft environment construction of the incubator has a positive effect on the incubating-efficiency. At present, the construction of hard environment has been overdone and increased the cost of incubator, which has no obvious effect on the efficiency of incubation；	Evaluation of NE development level and supervision of cultivation process, as well as targeted investment of incubating-resources, have positive effects on improving incubating-efficiency； The incubator should increase the input of soft service to improve the incubating-efficiency.； High-end talent service and technology service level can reflect the incubation capacity of the incubator；	NE key indicators do not only refer to the amount of turnover. The incubator pays too much attention to the turnover of NE, which will cause the overall incubating-efficiency to decline； The incubator's hierarchical management of incubation resources and dynamic allocation of resources are conducive to the stability of the incubation environment

	External investment and financing environment and internal financial service environment will directly promote the development of NE and improve the incubating-efficiency； The property right of the incubator or the property of the incubator resource does not affect the growth of the NE and the flow direction of the incubator resource allocation；	The operational management and support way of the incubator will have a positive or negative impact on the incubating-efficiency. That is, when the resources input link type service increases, it can effectively improve the incubating-efficiency, while when the policy supervision, statistics, and policy support service increases, it reduces the incubating-efficiency. Policy support for NE is a conditional factor；	and the improvement of incubating-efficiency.； The higher degree of marketization of the incubator industry, the lower the operating cost, and the stronger synergies between the incubators.； The strength of the cooperative ability of an incubator in the resource network will affect the stability of the incubation environment, thus leading to changes in the incubation efficiency. In other words, the stronger cooperative ability, the higher incubating-efficiency；
Consequence	The number of new enterprises and the degree of industrial concentration will affect the incubation environment inside the incubator, so the	In the process of optimizing the incubating-efficiency, the incubator should pay attention to the hierarchical resources, pay attention to the development evaluation of each stage of the NE, and	The turnover of NE will not affect the efficiency of the incubator. And the turnover as NE assessment indicators for supervision, while increasing management

dependence of external environment and the demand of resource acquisition will be affected.；

The stable state of the incubation environment is the result of the cooperative action of the incubator in the resource network and the foundation of improving the incubating-efficiency；

provide targeted entrepreneurial resource allocation services. At the same time, it can effectively reduce the cost of resource construction of the incubator；

The incubator manager should change its management concept from focusing on the traditional hard service resources to the soft service resources. Soft service resources mainly refer to high-end talent service, scientific and technological service, investment and financing service, market self-styled service, strategic and management consulting service, policy interpretation and specific support and declaration service, industrial circle resource docking service and so on；

While providing services and support, it prohibits direct intervention in the operation of NE and helps NE gradually

costs, reduce the incubating-efficiency;

The ability of building incubator resources comes from cooperative ability, and the type of resource depends on the incubator network environment or industrial environment. The stronger synergy, the incubation network is more stability; the less the costs, the more chance to get the resources; and the more start-up opportunities are in sync. As the center of entrepreneurial resources, the incubator must pay attention to its cooperative capacity building and the strength of the link in the incubation network. This is not only the basis of sustainable development of the incubator, but also the premise of reducing

adapt to the market competition environment；	operating costs and optimizing incubating-efficiency;

A new layered incubation system model and an optimal description of the incubating-efficiency

The mechanism of resource allocation based on the hierarchical incubation and efficiency improvement model proposed in this paper is the most innovative in combining the characteristics of virtual and network community, and the external environment of incubator operation is designed as a perfect competitive market. This is in line with the development trend of the incubator in the future and has theoretical value of in-depth research. Meanwhile, when constructing the incubation industry, the government should pay attention to the new layered incubation and efficiency improvement model, so that it becomes the reference blueprint and policy cornerstone of the incubator industrial strategic planning. The new model of hierarchical incubating system(HIS) and incubating-efficiency improving is shown in figure 5.2 1.
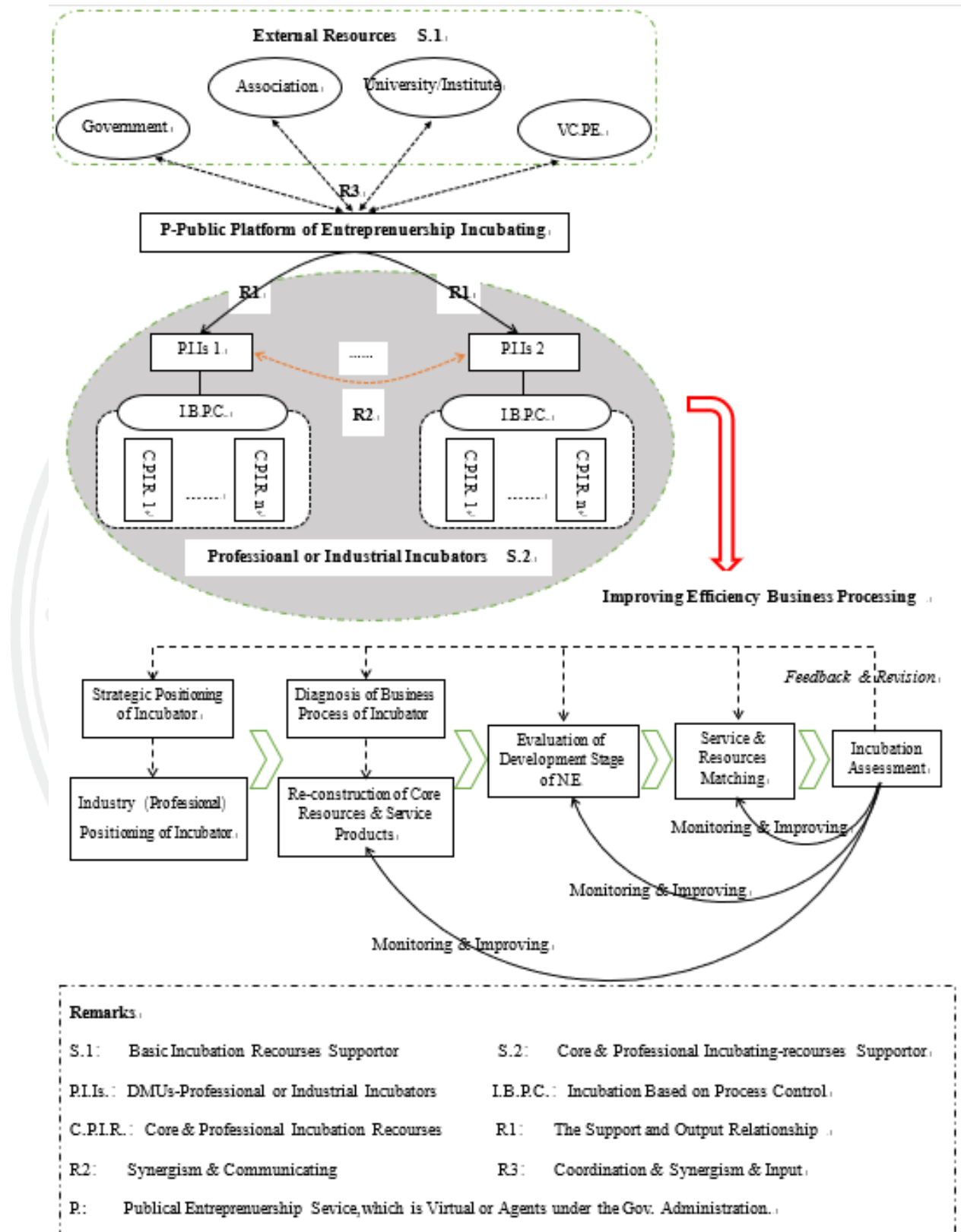
Figure 5.2 1 The new model of HIS and incubating-efficiency improving

5.3 Recommendations and Further Research

This study provides an idea for the construction of a new incubation model, provides an optimization strategy for the improvement of incubating-efficiency, and provides policy Suggestions for the construction of incubators.

Recommendations for Practice and Policy

The new model of layered incubation and efficiency improvement proposed in this paper (as shown in Fig5.2) has a positive effect on reducing the operating cost of the incubator, forming an organic incubation network, sharing basic incubation resources and ultimately optimizing the incubating-efficiency. It can be concluded from the research and analysis in this paper that the key to improve the incubating-efficiency lies in the re-sorting of the business process of the incubator. The core is to distinguish basic incubation resources from professional incubation resources and provide targeted configuration services. This puts forward a new requirement for the participants of the incubator industry construction. On the one hand, the government needs to change the thinking of the incubator industry construction planning, strengthen the construction of business environment, change from financial support to policy guidance, and build public incubation resource platform in the form of virtual incubator, or through self-built or entrusted. Incubator itself, on the other hand, should become the main body of market, strengthen the awareness of the organization's profit rather than as a subservient to the organization or industry, actively participate in market competition, and by providing high-end custom services and specialized resources configuration to promote the growth of NE, through the strip foundation of generic class service to reduce operating costs, thus promote incubator incubating-efficiency. Others, NE should take the initiative to conduct market docking at the incubation stage of the incubator and take the concentration degree of the incubation resource industry and the industrial docking service capacity as the basis for selecting the incubator, further optimize the resource allocation of the entire region and improve the incubating-efficiency.

Suggestions for improving incubating-efficiency mainly focus on the following points:

1. To improve the supporting mode of incubation to improve the incubating-efficiency from the perspective of reducing the management cost of the incubator.

The improvement of incubating-efficiency is not only the result of the efforts of the incubator itself, but also the change of the whole incubation environment. The government department of the incubator director plays an important role in advocating the change of the incubation environment, especially in the creation of the external environment. The government should transform from a manager to a service provider, avoid administrative intervention in the operation of the incubator, and build an orderly business environment, so that all the incubators in the region can participate in the competition in accordance with the conventional enterprises, and use market rules to adjust the survival of the fittest.

Most importantly, laws and regulations related to the management of NE and incubators should be established as soon as possible, instead of temporary documents issued by multiple departments, so that all incubators can operate under a unified legal framework and reduce the management cost caused by obtaining supportive policies. We will abolish the cash subsidy as the main form of support and replace it with the management mode of strategic development policy guidance and resource allocation market competition. In addition, government authorities or incubator associations should undertake the work of basic incubation services. Establish a virtual incubator for resource sharing and information disclosure, provide a zero-entry public incubation service, help more new companies in the initial stage, reduce the pressure on the incubator's entrepreneurial foundation services, and enable the incubator to focus on industry incubation and innovation. Promote the efficiency of the entire incubating-area of improvement.

2. The way to improving the allocation of resources is to improve the incubating-efficiency from the perspective of avoiding repeated construction of the same type of incubator, reducing waste of incubation resources during the allocation process and developing entrepreneurial financial services.

Incubation resources are the foundation of the incubator and the source of development. The structure, quality and quantity of resources in an incubator incubation resource pool will directly affect the efficiency of the incubator for the cultivation of

NE. The level of incubation resources reflects the incubator's ability to incubate, and it is also the key to improving the incubating-efficiency.

The incubator only divests the basic low-end service business, focuses on resource integration in the professional field, strengthens the connection with the industry, and pays attention to the development of industrial development and innovation factors. The comprehensive incubator needs to clarify the resource categories according to the business department model and establish an exclusive resource pool. And strengthen collaboration among management division. At the same time, the incubator should pay attention to the construction of resource channels, integrate itself into the entire incubation network, and reduce the cost of resource construction or allocation through coordination with other institutions, so as to make the cultivation of NE more industrialized and the high-value-added market docking and innovation activities more frequent.

To carry out the incubation activities, the incubator must strengthen the capacity of entrepreneurial financial services and transform from the work mode of mainly obtaining subsidies to the introduction of more qualified venture capital institutions. It is also necessary to strengthen the construction of its own startup fund, which can be financed by the government, Banks, investment institutions, self-raised funds and NE within the incubator.

3. To improve the evaluation criteria of NE to improve the incubating-efficiency from the perspective of providing targeted services and allocating development resources.

The core of entrepreneurship policy and incubator work is centered on the cultivation and development of NE. Therefore, the objective evaluation of the development level of NE is the foundation of the incubation work, and it is also related to the degree of the incubator resource allocation. Therefore, the incubator should establish a dynamic evaluation system throughout the entire incubation process according to its own resource characteristics. This incubation process mainly involves the background and service demand investigation before the entry of NE; Assessment of development level in incubation and investigation of resource demand; Stage evaluation and development advice before graduation; And after graduation, information, talent, financial docking and other links.

Ideas for the Future Research

Although some important conclusions have been made on the research of improving of incubating-efficiency, this paper is of certain practical significance for improving of incubating-efficiency of the incubator and formulating the industrial development plan of the incubator. However, due to the limitations of research conditions, research time and knowledge structure, there are some deficiencies in the research process and conclusions, which need further in-depth discussion and research in the future research:

Firstly, research will be the improvement of sample data.

The sample data in this paper mainly comes from the statistical yearbook of Zhejiang provincial science and technology department and Zhejiang incubator association. The sample area belongs to the Yangtze river delta region where the market economy is developed, and the entrepreneurial activity is carried out early. It doesn't involve the Midwest. In addition, to study feasibility and consider the accuracy of data acquisition, the samples were mainly incubators subject to national statistical supervision, and no new incubators or small featured incubators were collected. Therefore, the conclusion in this paper has certain limitations, and whether it is applicable to other regions remains to be continuously observed. In the future, the number of samples should be increased, and the sample structure should be further balanced to ensure scientific, objective and comprehensive research conclusions and enhance the adaptability of research conclusions.

Secondly, research will be the improvement of the study variables.

The improvement of incubating-efficiency is complex system engineering. The incubating-efficiency has a long-term influence on the growth of NE and even the development of regional innovation, talents and economy. This study only selected the static sample data, but the dynamic continuous incubator operation panel data calculation has not been realized. In addition, in the impact of the incubation network on improving incubating-efficiency, this paper did not conduct in-depth discussion and analysis. The establishment of more dynamic and rich research variables is the premise and basis for in-depth discussion of these issues. The next step should be to pay attention to the role of cultural factors in the improving of incubating-efficiency and

add some adjustment variables in the direction of cultural factors to strengthen the continuity and universality of the research conclusions.

Thirdly, research will be the improvement of research methods.

While expanding the number of samples, strengthening the sample structure and improving the quality of variables, the improvement of research methods should also be paid attention to and strengthened in the future research on the incubating-efficiency. Although this paper makes a preliminary study on the causes and improvement way of the incubating-efficiency of the incubator and builds a new layered incubation system model by using scientific methods. In addition to referring to many literatures and materials, qualitative and quantitative methods were used to conduct in-depth interviews and calculation of relevant statistical data. However, the samples and variables selected in this study can only answer the objective situation of incubator operation and the subjective perception of participants. The whole process is relatively inelastic. At the same time, it does not take care of the entire incubation cycle of the incubators in the entire region. The cultivation of new enterprises by incubators is a dynamic evolution process. The analysis of sample data in this paper is relatively static, and the evaluation of a certain static time point is adopted, which affects the accuracy of the research conclusion to some extent. In this regard, in the next step, some longitudinal research should be carried out to collect relevant data on the evolution and development of industrial clusters, establish a continuous database, and better explore the influence of incubators on the growth of NE. In addition, horizontal regional comparisons should be added to compare the incubation characteristics and efficiency characteristics of incubators in different regions, so as to find out a more widely applicable improvement and improvement scheme for incubating-efficiency and build a more adaptable and systematic optimization model for incubating-efficiency.

Fourthly, research will be the further exploration of the application of basic theory in the research of improving of incubating-efficiency.

Introduce the concept of management entropy; observe the relationship between the generation of entropy and the flexibility of the incubator strategic planning and management. And find out the impact of X-efficiency theory and synergy theory on entropy production in incubator operation. At the same time, the new model of hierarchical incubating system proposed in this paper was further tested under the

condition of introducing management entropy research, and the operation model of the next generation incubator and the incubating-efficiency improvement strategy were demonstrated, that is, the application of distributed organization collaboration protocol and dissipative structure in the incubator management.

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