How to Promote the Capability of IT Service Outsourcing Enterprises: from the View of Knowledge Transfer

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Abstract

Based on the knowledge resource theory, we know that the nature of enterprise capability is knowledge. But knowledge accumulation of IT service outsourcing enterprises is largely due to knowledge transfer in the outsourcing process, which plays an important role in the promotion of enterprise capability. While knowledge transfer is mainly affected by the sender's sending ability, receiver's absorption ability, knowledge transfer situation, the characteristics of knowledge and other factors. This article discusses the mechanisms and factors of knowledge transfer, analyzes the knowledge transfer process and effect on the subject of knowledge between the IT service outsourcing enterprises, then adopts system dynamics method to build the evolution model of IT service outsourcing enterprise knowledge transfer, and takes simulation experiments with Vensim tools, finally it proposes the evolution characters and transfer mechanism of knowledge transfer between enterprises. The conclusion can provide some suggestions for IT service outsourcing enterprises and a theoretical basis for the enterprises to develop knowledge transfer strategy.

Keywords: IT service outsourcing; enterprise capability; knowledge transfer; system dynamics

1. Introduction

According to the latest report from Gartner Group, it shows that global IT spending is expected to reach $3.8 trillion in 2014, compared with $3.7 trillion in 2013, up to 3.1%. While China's IT spending is expected to reach 2.13 trillion yuan, up 6.73% from 2013. Global IT service outsourcing market is growing rapidly; meanwhile China's IT outsourcing services market grows rapidly with a 28.5% average annual compound growth rate. Global transfer of service industries and off-shoring brings a great opportunity for the IT service undertaking enterprises. China's IT outsourcing enterprises has developed quickly along with the policy and environment changes well. However, as a whole, China's IT outsourcing enterprises are still at the bottom stage of global value chain that focus on the low business level.

It is a great opportunity for the IT service outsourcing enterprises in China, the prosperity of market and the policy guidance of IT human resources power create a great environment for the IT service outsourcing enterprises. Also China's IT outsourcing service enterprises are facing a huge challenge. On one side, China has good industrial policy environment and plenty of talented person, market resources, such as the number and scale of China's IT service outsourcing enterprises continues to grow, it become the second largest after India; on the other side, IT service outsourcing enterprises is undertaking the low-end business of IT outsourcing, the product quality and added value is not high, brand and scale effect is difficult to form, and lack of core competitive

advantage, so the enterprises' capability need to promote. Therefore, this paper puts forward the research question of capability upgrading of Chinese IT service outsourcing enterprises from the view of knowledge transfer.

The enterprise capability is essentially derived from the acquisition and accumulation of knowledge; the formation, accumulation and diffusion of knowledge mainly depends on knowledge transfer and flow. Knowledge transfer is an important aspect that affects the capability of undertaking enterprise to ascend. Integrated into the global value chain, IT service outsourcing undertaking enterprises in China can obtain new knowledge and technology through knowledge transfer in the process of IT service outsourcing, to upgrade the undertaking capability. Promoting the IT service outsourcing enterprise capability relies on the knowledge transfer in the process of service outsourcing.

2. Literature Review

Pietrobelli and Rabellotti(2004) stated that the enterprise cluster updating means creating more added value through innovation, from the perspective of the industrial cluster capability. Humphrey and Schmitz (2000) proposed that the industry upgrading is a process that the industry changes from a low technique level and low added value to a high technique level and high added value.

Although much research has been devoted to the IT outsourcing industry level, rather less attention has been paid to the micro level---that is, how to improve the enterprise capability in the global value chain. This article focuses on the analysis of promoting capability from the perspective of IT service undertaking enterprises.

Levina & Ross (2003) is the first to study the enterprise capability from the perspective of undertaking enterprises. They took case studies of Indian IT service outsourcing enterprises, and proposed that the core competence can be developed from three aspects of the organization learning ability, project management and process delivery, so as to create value for customers, and bring long-term cooperation and win-win situation.

Rajkum(2004) and other scholars also use India IT offshore outsourcing providers as the object, from the management level, project level, customer level, staff level to explore the key capabilities of IT service outsourcing enterprises. Through the analysis of India IT service outsourcing industry data, Ethira(2005) concluded that project management and customer communication have a positive impact on the IT service outsourcing project, and the impact of the former is more significant.

Some foreign research institutions such as Aberdeen group, Gartner Group, ITSqc from Carnegie Mellon University, on the basis of the best practice for IT service outsourcing industry, summed up the evaluate system of enterprise capability, which the most representative is from Carnegie Mellon University ITSqc Research Center (2007), the e-Services capability model.

Guo-peng Yin and Bo Yang (2010) use value chain theory as the main analytical tools, from six dimensions established China's service outsourcing enterprises capacity model and evaluation index.

Xiao-yan Li and Ji-ye Mao (2010) argue that IT service outsourcing enterprise competence is dynamic, by longitudinal study of three cases, they found that the dynamic capability is a multidimensional construct of polymerization, and the dynamic capability of local Chinese offshore outsourcing enterprise to carry on the operation definition.

The enterprise capability knowledge theory states that knowledge is highly circumstanced with the feature of recessive and discrete distribution. The real essence of an enterprise's capability is the accumulation of particular technologies and knowledge along with the development of the enterprise. This accumulation is a competition advantage resource for the enterprise. Accordingly, knowledge is the essential foundation of an enterprise's capability. Knowledge transfer also plays an important role in the enterprise's capability development.

Knowledge transfer includes the communication between the contractees and contractors, as well as the process of understanding and absorbing the knowledge for the contractors. In the outsourcing process, the factors that influence the knowledge transfer and enterprises capability are as follows: the contractee's capability of receiving the transferred knowledge; the contractor's capability to absorb the knowledge; the platform barrier of knowledge transfer; and the features of knowledge. Relationship between these factors and the enterprises capability is shown as follows.
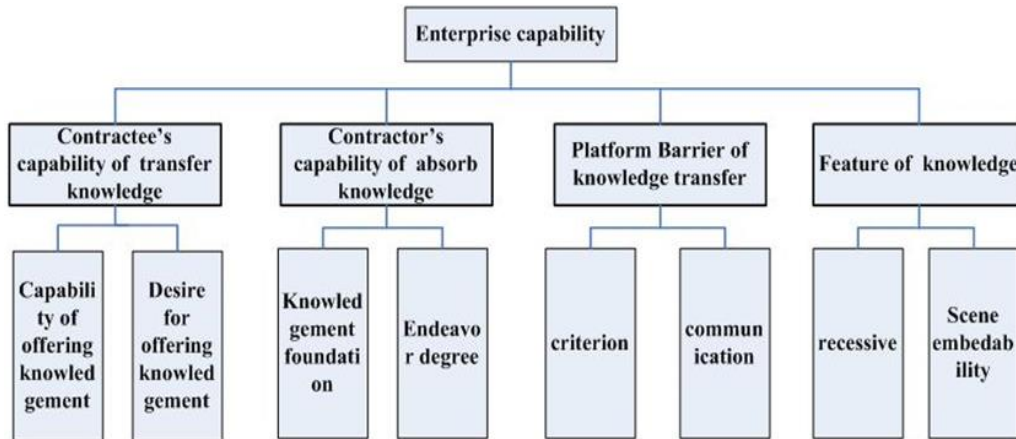
Figure 1. Factors of Knowledge Transfer and Enterprises Capability

3. System Dynamics Model of Knowledge Transfer between IT Service Outsourcing Enterprises

The knowledge transfer process between the IT service outsourcing enterprises follow the basic rules of knowledge transfer diffusion. Interaction and feedback exist in the knowledge transfer process, and knowledge stock has the characteristics of dissipative structure, therefore the knowledge transfer process conforms to the basic conditions of system dynamics modeling. Through analyzing the knowledge transfer process and impact on the receiver's knowledge stock, this paper proposes the causation of knowledge transfer and behavioral evolution characteristics based on system dynamics method, in order to build a system dynamics model of knowledge transfer, and to provide theory basis for knowledge transfer strategy of IT service outsourcing enterprise. Through quantitative calculation and simulation computation, we can verify the assumptions that which factors influence the enterprise capability promoting during the IT service outsourcing process.

3.1. Causality Model of Knowledge Transfer

In the process of knowledge transfer between enterprises, they can obtain knowledge that they cannot get before, increase the knowledge stock of organization, and realize the knowledge growth (Hubert, 1991). IT service outsourcing enterprises acquire external knowledge through cooperation, making valuable knowledge smoothly transfer between enterprises. Assuming the contractee enterprise as the sender of knowledge(S), contractor enterprise as the receiver of knowledge(R), knowledge growth of S is mainly decided by knowledge innovation and knowledge loss, R's knowledge growth is mainly composed of knowledge innovation, knowledge loss and knowledge transfer. Knowledge transfer amount is affected by five factors including knowledge gap, S's sending ability, and R's absorption ability, transfer threshold and transfer situation, and these five factors are positive correlation.

Knowledge gap is the potential difference of IT service outsourcing enterprises, the greater the potential difference, the stronger the knowledge transfer will. S's sending ability can ensure smoothly transfer of knowledge, while R's absorption ability ensure knowledge recipients can smoothly receive knowledge and understand knowledge. Transfer threshold is the sender's protection degree of core knowledge, the more close to the sender's core knowledge, the less knowledge will transfer. Transfer situation positively related to the knowledge transfer, the better the situation is, the more knowledge will transfer. Transfer situation mainly affected by trust, cooperation, knowledge complexity, and organization culture difference. Trust rank and cooperation transparency has a positive influence on transfer knowledge, the higher trust rank is, the more transparent cooperation is, the more knowledge will transfer; While knowledge complexity and organization culture difference has a negative effect on knowledge transfer, the more complex the knowledge is, the bigger the organization culture difference is, the less knowledge will transfer. Causality model of knowledge transfer between IT service outsourcing enterprises is as follows.
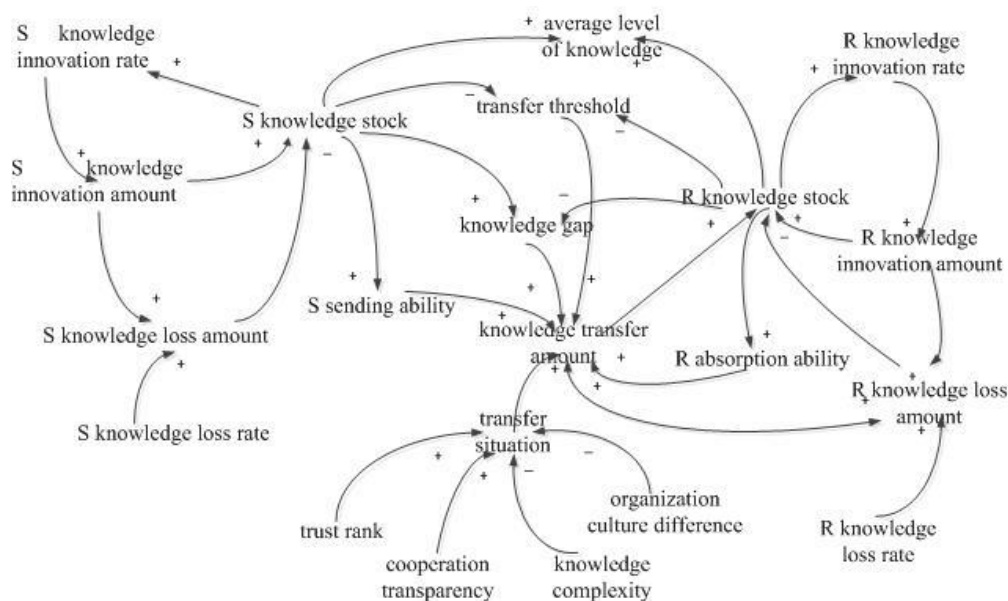

Figure 2. Causality Model of Knowledge Transfer between IT Service Outsourcing Enterprises

In this model, we use two parameters to measure the increase or decrease of knowledge stock: knowledge innovation rate and knowledge loss rate. The innovation and loss of knowledge is a constant process of evolution, it can be seen as a function of time. And the average level of knowledge reflect the mean knowledge stock on both subjects in the evolution process of knowledge transfer, in a given time period, if the average level of knowledge increase, and knowledge gap decrease, it shows a higher overall efficiency of knowledge transfer. The main feedback loop as bellows:

S knowledge stock → S knowledge innovation rate → S knowledge innovation amount → S knowledge loss amount → S knowledge stock

R knowledge stock→ R knowledge innovation rate → R knowledge innovation amount → R knowledge loss amount → R knowledge stock

R knowledge stock → transfer threshold → knowledge transfer amount → R knowledge loss amount → R knowledge stock

R knowledge stock → R absorption ability → knowledge transfer amount → R knowledge loss amount → R knowledge stock

R knowledge stock → knowledge gap → knowledge transfer amount → R knowledge loss amount → R knowledge stock

3.2. System Flow Chart of Knowledge Transfer

The basic assumption of the model is:

1) There is knowledge gap between both sides of IT service outsourcing enterprises, and the sender's knowledge stock is higher than the receiver's. The sender has the motivation of knowledge transfer in order to get the collaboration value and business reputation, while the receiver will actively learn and absorb the transfer knowledge to improve their own knowledge level.

2) The knowledge stock of the sender is higher than the receiver, so the knowledge innovation rate is higher too; while the receiver will digest, absorb and apply the knowledge, the knowledge loss rate is lower than the sender.

The system flow chart of knowledge transfer between IT service outsourcing enterprises is shown below:
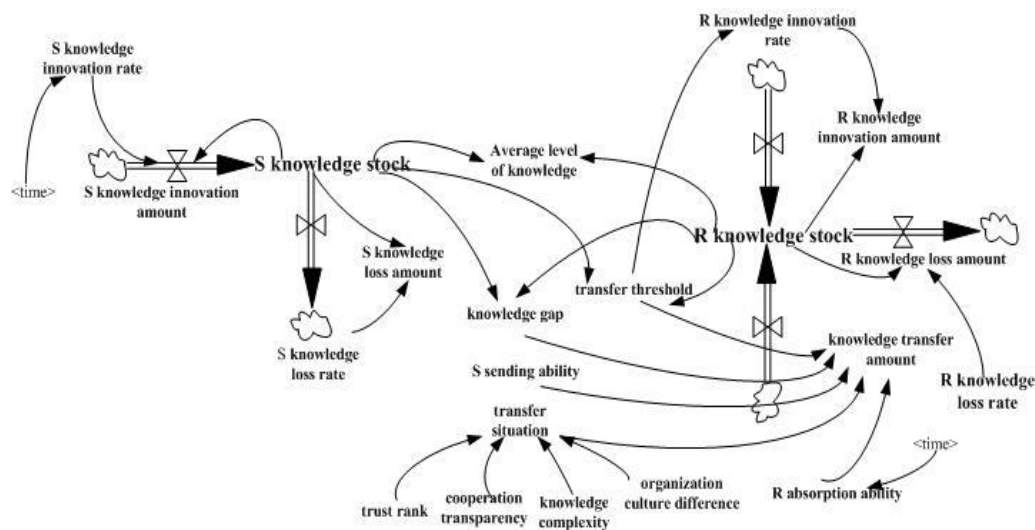

Figure 3. System Flow Chart of Knowledge Transfer between IT Service Outsourcing Enterprises

There are two state variables in the model: S knowledge stock and R knowledge stock; five flow variables: S knowledge innovation amount, S knowledge loss amount, R knowledge innovation amount, R knowledge loss amount, knowledge transfer amount; seven auxiliary variables: the average level of knowledge, knowledge gap, S knowledge innovation rate, R knowledge innovation rate, R absorption ability, transfer threshold, and transfer situation; Seven constants: S knowledge loss rate, R knowledge loss rate, S sending ability, trust rank, cooperation transparency, knowledge complexity, and organization culture difference.

3.3. The Main Variable and Equation Design

1. State variable equation

S knowledge stock = INTEG (S knowledge innovation amount - S knowledge loss amount, 100)

R knowledge stock = INTEG (R knowledge innovation amount + knowledge transfer amount - R knowledge loss amount, 5)

2. Flow variable equation

S knowledge innovation amount = S knowledge stock × S knowledge innovation rate

S knowledge loss amount = STEP (S knowledge stock × S knowledge loss rate, 5)

R knowledge innovation amount = R knowledge stock × R knowledge innovation rate

R knowledge loss amount = STEP (R knowledge stock × R knowledge loss rate, 5)

Knowledge transfer amount = DELAY1I (IF THEN ELSE (transfer threshold < 0.9, knowledge gap × S sending ability × R absorption ability × transfer situation, 0), 5, 0)

3. Auxiliary variable equation

The average level of knowledge = (S knowledge stock + R knowledge stock) / 2

Knowledge gap = S knowledge stock - R knowledge stock

S knowledge innovation rate= WITH LOOK UP (Time, ([(0,0) - (60, 0.1)] , (0, 0.05), (60, 0.006)))

R knowledge innovation rate = 0.02 × transfer threshold

Transfer threshold = IF THEN ELSE (R knowledge stock / S knowledge stock < 0.9, R knowledge stock / S knowledge stock, 0.9)

Transfer situation = IF THEN ELSE (trust rank × cooperation transparency > knowledge complexity × organization culture difference, rust rank × cooperation transparency - knowledge complexity × organization culture difference, 0)

The loss of knowledge needs a process. In the design of the above variable equation, we adopt step function to simulate the process of S knowledge loss amount and R knowledge loss amount. Knowledge began to fail from the simulation time after five units. First-order delay function is used to reflect the process of knowledge transfer amount, set up the initial knowledge transfer amount to 0, knowledge begins to transfer from the simulation time after 5 units delay. S knowledge innovation rate adopts table function. With the increase of S knowledge stock, its innovation rate also increases. In this experiment, the simulation time set in 60 units, S knowledge innovation rate linearly increase one percent. Transfer threshold reflects the degree of knowledge transfer; the sender will stop knowledge transfer when the knowledge stock proportion exceeds a certain value in order to maintain its own competitive advantage. This paper sets a threshold value of 0.9, when the threshold over 0.9, knowledge transfer stops immediately, transfer amount turns to 0.

4. Experiment Results

The model is simulated and run in the Vensim PLE environment. Because IT service outsourcing project is generally in six months or one year, so we will set the simulation time to 60 weeks. Knowledge is difficult to measure by the concrete numerical value to quantify, and the simulation test just need to satisfy the requirement of simulation setting value. Considering the knowledge potential difference exists in contractee and contractor enterprises, the initial knowledge stock of the sender is larger than the receiver, we set the initial value of S knowledge stock as 100, R knowledge stock as 5, S knowledge sending ability coefficient as 0.7, S knowledge loss rate as 0.01, transfer threshold value as 0.9. The value of trust rank, cooperation transparency, knowledge complexity, and

organization culture difference in transfer situation is between [0, 1]. The simulation results are shown in the figures below:
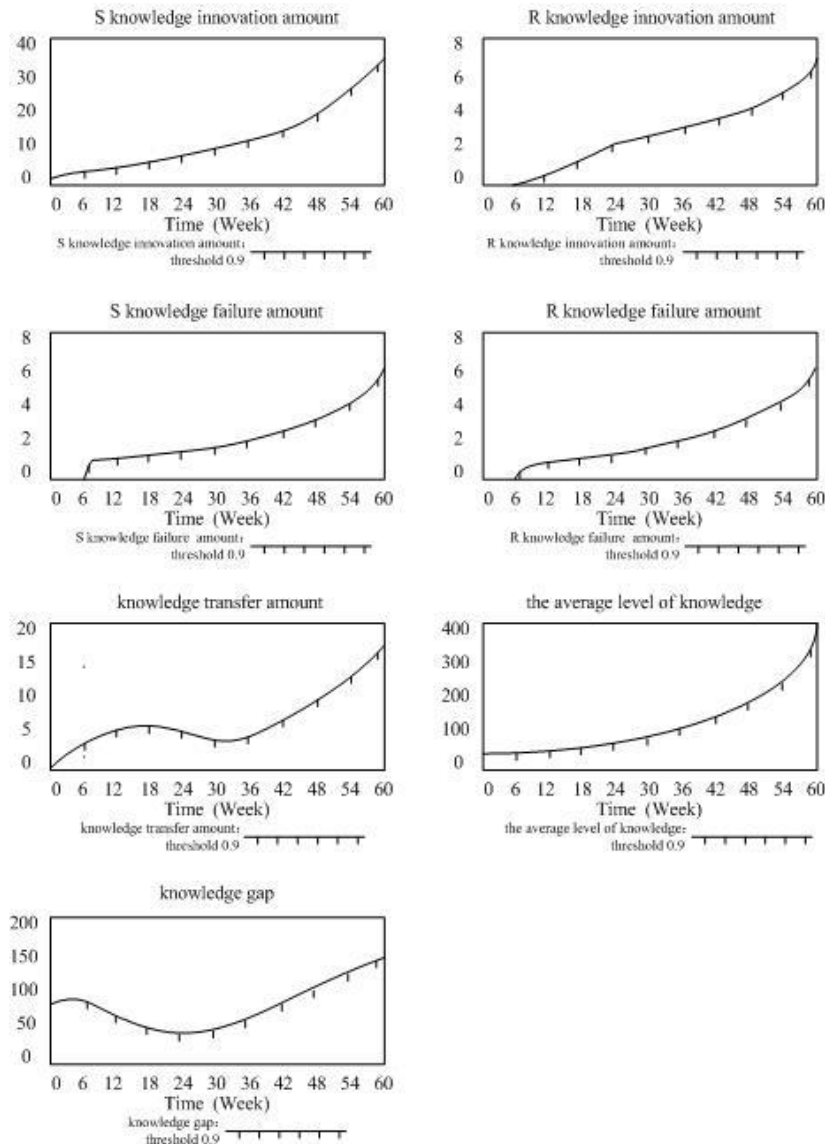

Figure 4. The Simulation Results

From the results of simulation, we can find that the knowledge innovation amount of S and R presents a gradual growth trend. S has stronger knowledge base, and its knowledge innovation rate is higher than R, so its knowledge innovative amount is growing faster than R.

At the same time, the knowledge loss amount of S and R also gradually increase over time, because in the process of knowledge transfer, R sorts, absorbs and internalizes the transfer knowledge, and R knowledge stock is less than S, therefore R's knowledge loss rate is slightly lower than that of S.

Knowledge transfer amount presents spiral rising trend of first rise and drop and rise, when transfer threshold reach the final boundary value, knowledge transfer process stops.

The average level of knowledge constantly increased and accelerated. During the knowledge transfer progress, the knowledge transfer amount increased gradually, R knowledge stock and knowledge innovation rate also constantly improved, and then accelerated the average level of knowledge.

Knowledge gap also presented first rise and drop later, at the beginning of the process, S knowledge innovation ability widen the knowledge gap in short-term. along with the knowledge transfer amount and R knowledge stock increased, due to the R knowledge loss rate is low, and the knowledge gap will shrink into an adjustment period until it reach a critical value. The advantage of S knowledge innovation ability shows again, the knowledge gap widens again, R knowledge stock was elevated to a new level, and knowledge gap has risen in a spiral trend.

5. Conclusions and Contributions

In conclusion, by analyzing the above influencing factors of knowledge transfer process between the two sides of IT service outsourcing enterprises, we built the dynamics model of knowledge transfer, and used the Vensim software for system simulation, and finally analyzed the simulation results. From the results, we found that the model is fitting for the actual service outsourcing knowledge transfer process, and it reveals the characteristics and mechanism of the knowledge transfer between enterprises from a certain extent.

This article use system dynamics theory to construct the dynamic evolution model of IT service outsourcing enterprise capability upgrading and knowledge transfer. Capability upgrading and knowledge transfer have interaction and feedback in the process of IT service outsourcing, there exists enterprise knowledge stock with growing dissipative structure characteristics, capability upgrading is an dynamic evolving process. It finally constructed the IT service outsourcing system dynamics model of knowledge transfer between enterprises, analyzed the undertaking enterprise internal knowledge system of self-organization process, established the dynamic evolution model of enterprise capability upgrading; And using the simulation tools for model fitting test and analysis, it discussed and put forward the IT service outsourcing enterprise knowledge transfer and evolution characteristics and transfer mechanism, to provide theory basis for IT service outsourcing enterprises to develop strategy for knowledge transfer.

The study of service outsourcing enterprise knowledge transfer mechanism provides a new way also a theoretical basis for knowledge transfer strategies for the IT service outsourcing enterprises. It has a contribution to existing research and practice, and it can supply suggestions for the enterprise IT outsourcing.

Acknowledgments

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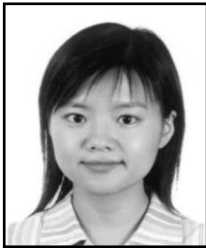
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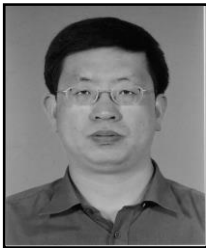
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