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Risk identification and conduction model for financial institution IT outsourcing in China

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Abstract In this paper we study the risks around IT outsourcing in Chinese financial institutions. We build a framework that explains the conduction paths from risk factors to risks, and from risks to resulting losses. Our framework describes relationships among 8 risk factors, 7 risks and 4 kinds of losses. Through case study we find that the main risk factors faced by Chinese financial institutions during IT outsourcing include limited IT literacy, limited choices of contractors, cultural conflict and objective misalignment with the contractors. These factors comprise the main differences between developing and developed countries in their financial institution IT outsourcing practices.

Keywords IT outsourcing · Risk identification · Risk conduction · Chinese financial institutions · Case study

1 Introduction

As market competition intensifies and businesses become more complex, financial institutions increasingly rely on information systems for every aspect of their operation and management [10, 23, 24, 26, 32, 41, 48, 49, 51]. The information systems of many financial institutions are either partly or entirely outsourced to professional IT service providers. A report by China Computer World Research (CCWR) shows that the market share of financial institution IT outsourcing in China in 2010 was 7.5B RMB (equivalent to 1.18B USD). With an annual growth rate of 21.03 %, the compounded growth rate of the Chinese financial institution IT outsourcing market was projected to be 22.91 % for the years 2011–2014. Financial IT outsourcing is becoming one of the most important market segments in China's IT outsourcing industry [11].

Operational risk, credit risk and market risk constitute the three greatest risks of financial institutions. IT outsourcing has become a major operational risk for financial institutions [7]. The US Federal Financial Institutions Examination Council (FFIEC) published *Guidance on Information Technology Management and Outsourcing Technology Services*, to help financial institutions manage their IT outsourcing risks [15].

The IT outsourcing of China's financial institutions is still at an early stage compared to that of more developed countries. There are significant differences between the IT outsourcing risks of China's financial institutions, its other industries, and those financial companies that operate outside of China. Building on current theories and literature, we identify a set of risk factors, risks and potential losses that financial institutions incur through IT outsourcing. Through surveys and case studies, we analyze the conduction mechanism of how risk factors lead to certain risks and how these risks result in losses.

We build a framework that explains the causal relationship from risk factors to risks, and then from risks to resulting losses. We will first review the current literature on risk identification from the perspectives of three major components in our framework: risk factors, risks, and losses. Next we describe our theoretical framework and the resulting hypotheses. Then we present our case study and the results of

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our data analysis. We summarize our major findings from the case study, and conclude the paper with the contributions and limitations of the research in this paper.

2 Literature review

According to Merriam–Webster dictionary, risk is something that creates a possibility of loss or damage. The research of IT outsourcing risk management consists of three parts: risk identification, risk assessment and risk control. Risk identification is the basis for risk assessment and risk control. Risk identification can be further categorized into three perspectives: identification of risk factors, identification of risks, and identification of losses due to these risks (Fig. 1). There is a broad selection of research pertaining to risk identification and risk management in IT outsourcing, and in the following sections we review some of the relevant articles from each of these perspectives.

2.1 IT outsourcing risk factors

Research on risk factors has often been based on the transaction cost theory and principal-agency theory.

The research of Aubert et al. [3], Bahli and Rivard [5] proposes 7 risk factors (asset specificity, limited suppliers, uncertainty, relatedness, measurement problems, expertise with the IT operation, and expertise with the outsourcing) and 4 risks (hold-up, expensive contract changes, unexpected turnover/management costs, and disputes/litigation). All of these risks can lead to higher cost and lower service quality. Some authors worked further on the measurement of these risk factors [6, 21, 27].

Other authors provided evidence that the main factor affecting the quality of IT outsourcing projects was the clients' and service providers' lack of expertise with the IT operation itself [1, 33–35].

In addition to the above factors, the completeness of the IT outsourcing contract was a very important risk factor [8, 14, 33]. Based on the theory of outsourcing value chain, Bi proposed that an outsourcing contract should include 11 key components: service level and incentives, vendor personnel, data protection, privacy and intellectual property, price protections, third-party assignments, ownership of assets used or created by partnership, conflicts among different legal systems, contingency planning and change management, notice of adverse material impacts, right to audit, and termination [8].

Fig. 1 Relationship of risk factor, risk and losses

Some authors recommended that the information asymmetry between service providers and clients was an important risk factor in IT outsourcing [13]. Different goals and cultures was another important risk factor that was stressed by some authors [4, 20, 23, 47].

2.2 IT outsourcing risks

By introducing the concept of expected loss, Aubert et al. [3] classified risks of IT outsourcing into four categories: hidden costs, contract costs, lower service quality and weakening of organizational competitiveness. They also proposed a more comprehensive framework and established a correlation mechanism of risk factors, unintended consequences and the actual outcome [4].

From the survey of 357 large companies and review of the corresponding studies, Gonzalez et al. [19] concluded that excessive dependence was the major risk in IT outsourcing. Aubert et al., Hococht and Trott, Lacity et al., Segev and Gebauer [4, 25, 29, 44] suggested that leakage of information or security problems would make the company lose its core competitiveness.

Gewald and Gellrich, Kern et al. and Willcocks et al. [18, 27, 45] found that risks of low quality of enterprise services could be caused by the lack of professional competence of the outsourcing vendors, poor financial position of the contractor, and subcontracting of the project by the contractor.

According to some authors, many institutions which outsourced their IT activities felt that the practice would negatively impact their core competitiveness by increasing the risks of losing key employees, limiting their ability to access new technology, and limiting their ability to define new technologies [14, 20, 33]. With only a limited number of vendors in the marketplace, the clients felt it was difficult to govern the outsourcing deals and experienced weakened bargaining power at the time of contract renewal [6, 12].

2.3 IT outsourcing losses

There are many studies focused on IT outsourcing losses, most of which are from the perspective of cost. Lacity et al. [29] pointed out that cost factor is an important criterion when making outsourcing decisions. Explicit cost refers to the variable cost according to the contract, while implicit cost includes unexpected turnover and management costs. Companies do not accurately project the implicit cost in their outsourcing cost assessment, and this may add large dollar amounts to the overall expenditure. According to a study by Lacity and Hirschheim [28] of IT outsourcing practices at 14 of the top Fortune 500 companies, most of these companies did not achieve their expectation of cost. Out of the 18 outsourcing motivations they summarized

based on the transaction cost theory, 12 could be explained from the cost perspective. Williamson [46] illustrated that cost efficiency, including production cost and potential transaction cost, is the only criterion organizations use when making trading decisions.

With increasing dependence of the institutions on the service provider, another potential loss is having to sacrifice partly or even all of the assets to get out of the relationship [2, 44]. IT outsourcing also could weaken the company's management skills of IT systems, and reduce its understanding of its own information systems. That could increase the information asymmetry between the institution and its service provider, which could further weaken the institution's ability of contract negotiation, services level and cost control [14, 16, 22, 39].

IT outsourcing may also cause loss pertaining to an enterprises' skills, learning capabilities and innovation. Enterprise skills include a company's core intellectual property, business secrets, and strategic/tactical information which reflect its unique edge over the competition. Enterprise abilities consist of the company's capability to learn, innovate, adapt, restructure, etc. The empirical research of Earl indicated that the drawbacks of IT outsourcing include degradation of learning abilities, lack of innovation, fragmentation of IT resources and detachment of IT from the core business [14, 19, 39].

Moreover, the service provider and its employees may attain access to some of the client company's confidential information thereby allowing leakage of intellectual property. This could cause the enterprise to give up some parts of its business. As a result of this, the company could lose some of its technical abilities which in turn could cause the company a loss of its competitive edge. Losing key skills and abilities, whether by an outsourcer's opportunism or for technical reasons, is detrimental to these institutions. It leads to economic loss, loss of reputation, and loss of customer trust [18, 20, 25].

The potential losses from IT outsourcing also include uncertain service quality and timeliness of the company, difficulty of predicting the technology development trend, idling of the IT outsourced system and costs due to system updates [4, 14, 33].

To sum up, the losses that may occur during IT outsourcing are reflected in four parts: rising costs, decreased flexibility, decreased control, and decreased competitiveness (of which the main features are innovation and learning capabilities).

2.4 Deficiency of existing research

While existing research proposes possible identification of risk factors, risks and losses during enterprises' IT outsourcing practices, there are several major deficiencies.

First, although the relationship among risk factors, risks and losses have been discussed, there has not been sufficient effort made to distinguish them. While directly leading to risks and indirectly leading to losses, risk factors should be distinguished from risks and more studies are needed to provide guidance for preventive risk control and policy making.

Second, research on the risks of IT outsourcing for financial institutions has been scarce. Compared to other types of organizations, financial institutions have a different risk tolerance for IT outsourcing. As financial IT outsourcing is one of the largest market segments in IT outsourcing, more research efforts should be put into this area.

Third, Chinese financial institutions are not sufficiently covered by current studies. Chinese financial institutions are mostly state-owned or led by the government, and have different operating mechanisms compared to foreign financial institutions in developed countries with free market economies. Key risk factors are different in these different situations. Moreover, as IT outsourcing practices in China's financial institutions are in their primary stage, there are significant differences in IT outsourcing patterns compared to financial institutions in developed countries.

To address the aforementioned gaps, we will present a theoretical framework that distinguishes risk factors, risks and losses specifically for Chinese financial institution IT outsourcing.

3 Theoretical framework and hypotheses

To analyze the IT outsourcing risks of Chinese financial institutions, we build a framework containing three elements (risk factors, risks and losses) and the conduction relationship among these elements (Fig. 2). Risk factors are defined as various factors that have an effect (positive or negative) on risks. Risks are defined as events, situations or activities that may result in a potential loss. Losses are defined as the negative outcomes resulting from risks. Note that risk factors are not risks themselves, and risks do not necessarily result in losses. Motivated by existing theories and literature, we will develop a number of hypotheses on the relationships among these elements in our risk analysis framework for IT outsourcing in Chinese financial institutions:

H1a Two of the risk factors, asset specificity and limited choices of service providers in the marketplace, will both lead to excessive dependence on the provider.

H1b Excessive dependence on the provider makes it difficult to switch providers and results in decreasing flexibility of the institution.

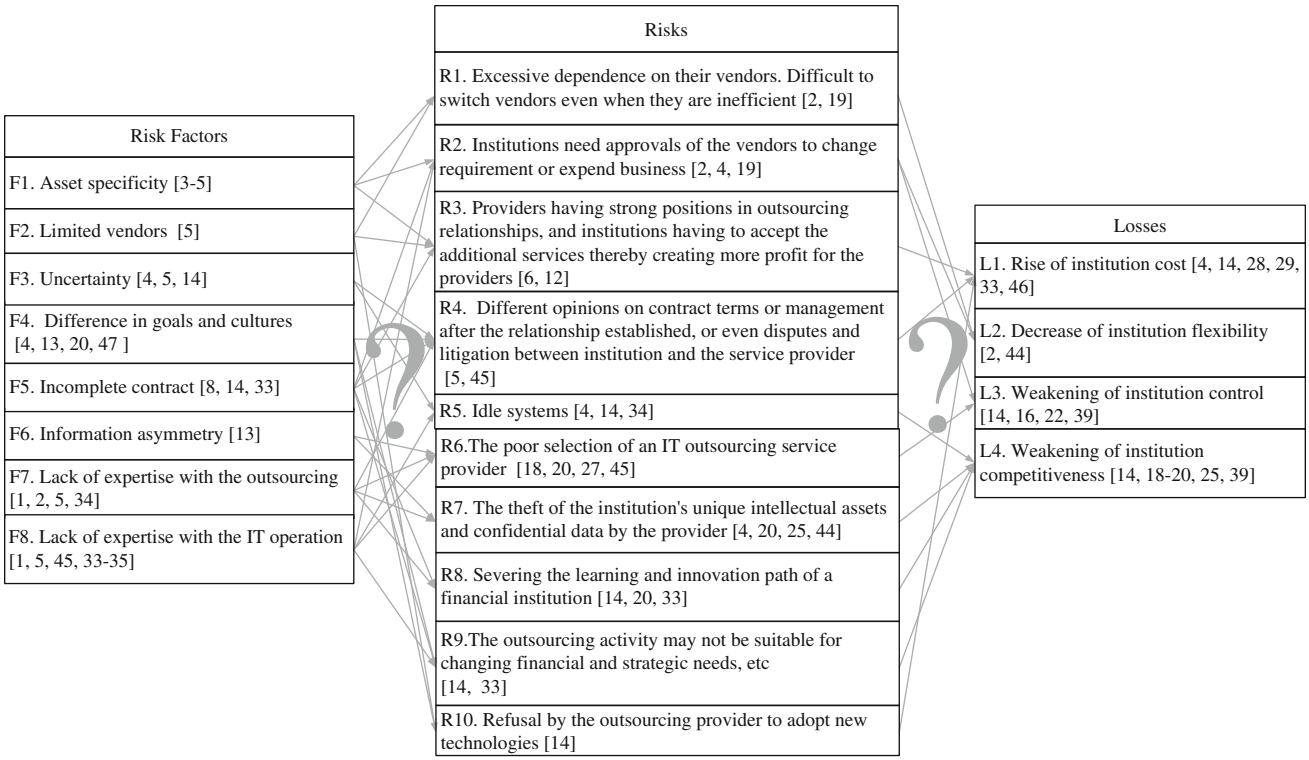

Fig. 2 A theoretical framework of risk elements and their relationships in financial institutions' IT outsourcing

H2a The three risk factors of asset specificity, incomplete contract and provider's lack of expertise with the IT operation can all lead to the risk of "Institutions' needing approvals of the providers to change requirement or expand their business".

H2b Institutions need approvals of the providers when they want to change requirements or expand their business. This will weaken the institution's flexibility and control.

H3a The three risk factors of asset specification, limited choices of service providers in the marketplace and incomplete contract can all lead to the risk of "providers having strong positions in outsourcing relationships, and institutions having to accept the additional services thereby creating more profit for the providers".

H3b Providers having strong positions in the outsourcing relationship can cause rises in outsourcing costs.

H4a There are four risk factors that can lead to disputes and litigation between the institution and the service provider once their relationship has been established: the uncertainty of potential conflicts, the difference in goals and culture between the institution and the service provider, an incomplete contract that does not provide for conflict resolution, and employees of both the institution and service provider who lack sufficient outsourcing management experience.

H4b Once the relationship is established between the institution and the service provider, differing opinions on contract terms and management can often lead to disputes which may then lead to litigation. Litigation will, in turn, cause lower efficiency, contract extension and ultimately extra costs for the institution.

H5a The uncertainty of potential conflicts and the lack of expertise with IT operations are two risk factors that lead to unpredictable technology changes in future business needs. When institutions outsource inappropriate resources, they experience idle systems and lower working efficiency.

H5b Idle systems and lower working efficiency will weaken the institution's competitiveness.

H6a Three risk factors that can lead a financial institution to make a poor decision in selecting an IT outsourcing service provider are: information asymmetry during vendor selection, lack of outsourcing management experience in both parties and the service provider's overall lack of expertise with IT operations.

H6b The poor selection of an IT outsourcing service provider will weaken the institution's control.

H7a Asymmetric information between the financial institution and the IT outsourcing service provider may cause hidden information and hidden behaviors. It may also

exploit the institution's employees' lack of outsourcing management experience. These two risk factors may lead to the theft (blatant risk) of the institution's unique intellectual assets and confidential data by the provider.

H7b The theft of the institution's unique intellectual assets and confidential data by the provider will weaken the institution's competitiveness.

H8a A financial institution's lack of IT outsourcing management experience may lead to the severing of its learning and innovation path. This could cause the institution to gradually lose its professional skills, technical expertise and innovation potential.

H8b Severing the learning and innovation path of a financial institution may cause it to lose some of its competitiveness.

H9a Because different goals and cultures between the institution and outsourcing provider may elicit different responses to external changes and because IT outsourcing is a long-term decision, the outsourcing contract and the provider's IT ability may not be suitable to the developing business of the financial institution. These factors all lead to the risk of "the outsourcing activity may not be suitable for changing financial and strategic needs", etc.

H9b Outsourcing activity is not suitable for the changing financial and strategic needs of the institution and may weaken its competitiveness.

H10a In the IT outsourcing projects of financial institutions, different goals and cultures between the service provider and the client, and limited provider choices in the marketplace may lead to the risk of the outsourcing provider refusing to adopt new technologies.

H10b Refusal by the outsourcing provider to adopt new technologies may cause increased potential cost to the institution.

4 Case study and methodology overview

4.1 Background of the cases

In China, many financial institutions still choose in-house development over outsourcing. For instance, the largest domestic commercial bank, Industrial and Commercial Bank of China (ICBC), has over 12,000 specialized IT staff who undertakes the development of many applications and systems as well as all the system operation and maintenance. The most important criteria when we select an institution for our case study is that this financial institution must have substantially adopted IT outsourcing, and have first-hand experience of issues that may occur during an IT outsourcing process. Since financial institutions can be categorized as banks and non-bank financial companies, we try to study one in each category. Moreover, the researchers of this study chose the institutions where they could reach suitable interviewees, including industry experts with abundant experience on IT outsourcing project management.

4.1.1 Institution A:[1] An asset management company

Institution A is a professional asset management company approved by the China Insurance Regulatory Commission. It started in March, 2006. It is one of the largest institutional investors in the domestic capital market, with registration capital of 1 billion RMB and a total of 380 billion RMB under management.

Compared with banks, many non-bank financial institutions in China have a relatively small staff and scale of business. By the end of 2011, Institution A had a staff of 300, including 15 IT specialists who managed their core business systems (trading system, evaluation system, risk control system, investment research systems, etc.).

Institution A directly purchased and implemented some mature application systems from its business partners (50 IT service providers), and additionally, invited external vendors to develop some application systems based on their own business demands.

The major responsibilities of the IT department in this institution include collecting requirements from business departments, constructing the information system through cooperation with vendors, and the operation and maintenance of the information system itself.

Overall, the business scale and the IT management capability of Institution A are representative of non-bank financial institutions in China.

4.1.2 Institution B: a state-owned bank

Institution B is a main player in China's long term investment and financing field, and the largest cooperative bank of Chinese foreign investment and financing. Institution B was founded in 1994 and reached a total asset of over 6 trillion RMB by the end of 2011. Institution B focuses on investing in national infrastructure and wholesale financing Chinese households. Currently Institution B has 35 branches, 4 representative offices and over 7,000 employees in mainland China.

After the year 2000, the reform of the Chinese banking industry led to fierce competition between banks in China. Adhering to its strategic goal of "to be the best bank",

[1] The name of Institution A and Institution B were created to conceal the actual name at the request of the interviewees.

Institution B was constantly expanding its business and reforming its internal structure and business processes. However, due to its lack of IT human resources (the bank only had about 30 IT staff in 2003) its IT services could not support the expanding business. The slow informatization process at Institution B had become the bottleneck of its business development.

Starting from 2002, the bank progressively adopted an IT outsourcing strategy to help solve this problem. After thoroughly considering its demand characteristics and studying the experiences of similar American commercial banks, Institution B made the decision to outsource its less profitable and non-core business layers. This allowed the bank to focus its resources on the development of its core business.

At the end of 2003, Institution B signed an agreement with HP on the full range of desktop support services at its headquarters in Beijing and its branches in 32 cities across the country. The outsourced IT services included management and maintenance of hardware and software equipment, system operation and maintenance, and IT asset management. Institution B became the first financial institution in China that used outsourcing strategy to accelerate informatization.

In 2005, Institution B started its core IT system development in cooperation with Digital China Ltd. who was one of the biggest IT service providers in the country. It was the first time that a Chinese financial institution successfully purchased and implemented a core business system from an IT outsourcing service provider. As time passed, Institution B continued to employ IT service providers to outsource its risk management system, data integration platform and other hardware and software systems.

By 2010, 81 % of the bank's 48 application systems had been put into operation to supports its business in the following areas: investment, loan, debt and rent, and organizational management and control. Among these systems, the implementation of the second phase of the bank's core business system is the most important. The second phase was built for the bank's process reengineering and new business development, and to support its overseas branches, finance company, security company, leasing company and rural banks. In 2011, the bank started developing new systems including the integrated process credit management system, customer relationship management system and data warehousing through IT outsourcing.

The depth and breadth of Institution B's IT outsourcing has become a benchmark and is difficult for other financial institutions in China to attain. Even with heavy outsourcing, the professional IT staff at Institution B grew from a few dozens to approximately 230. The IT bureau of Institution B was rebuilt in July 2010 and included one development and testing center and one data operations center.

4.2 Methodology

In this paper, we try to study the identification of risk factors, risks and losses associated with IT outsourcing (the "what" question), then further study the conduction relationship among the three categories (the "why" question). We focus on current problems in the IT outsourcing processes of Chinese financial institutions. In risk conduction relationships, multiple possible factors may affect the same risk, or a risk factor may affect multiple risks. Many factors cannot be easily quantified, such as the capability of employees, company culture or expertise within IT operations. We chose the case study method to make the study more connected to specific characteristics of the financial institutions and background of the IT outsourcing projects.

Most research in the IT and management field adopts the case study method to explore complex relationships in an organizational context [17, 31, 36–38, 40, 42, 43]. The case study approach allows us to test hypotheses with theoretical motivations, while also allowing new discoveries and explanations to emerge in an interpretive approach. As an empirical research method case study is widely used in social sciences.

Our study follows the case study guidelines described in Yin [50], which are followed by many other researchers in the IT field [36, 40, 42, 43]. To ensure reliability and reduce subjectivity, three researchers participated in the case study. Based on current publications and expert surveys, the three researchers developed the case study protocol which includes the list of interview questions and potential themes to be explored in the interview. The protocol was pretested on several colleagues who had experience with IT outsourcing in the financial industry. We established a database to manage the audio recordings, interview transcripts, information found online, and meeting notes from informal conversations with interviewees during field work.

To ensure external validity, we adopted multiple sources of evidence including interview transcripts, web-based information and meeting notes. We adopted a dual case study method by replicating a single case study on two different entities. Data collection closely followed the case study protocol. The initial draft of the case was reviewed by three interviewees. They also recommended some changes.

The interviewees from Institution A included the director of the IT department of the company (who is responsible for the institution's IT system planning, implementation and maintenance), and two senior IT project managers who report to the director.

The interviewees from Institution B included the former deputy director of the operation center, and two current senior managers from the IT department. The former deputy director of the operation center had been

instrumental in the strategic planning/execution of IT outsourcing for Institution B. As such, he had an in-depth understanding of the IT outsourcing market in China, as well as the IT requirements banks have for this type of project management.

The other two interviewees of Institution B were both senior project managers with over 5 years of experience in IT outsourcing project management and over 10 years of experience in IT system development and management. One of them was in charge of the operation management of the outsourced IT system, while the other was responsible for the management of the outsourcing project under development.

We had face to face interviews for data collection. The interviews were conducted outside their respective companies, lasted 1–2 h, and were both recorded and transcribed. The literature collection and review were performed before the interview process. It should be noted that the purpose of this research was to confirm the hypothesis shown in Fig. 2, explore the risk elements that affect the IT outsourcing practices of Chinese financial institutions, and explain the causal relationships among these elements. The risk conduction model in Fig. 2 provided a reasonable framework for questions during the interviews. It ensured that the interview did not deviate from the established research direction, and that questions related to each hypothesis would not be omitted. To prevent undue influence over the mindset of the interviewees, the researchers did not provide any structured or semi-structured questionnaire, and did not present the conduction model during the interview process.

The first phase of the interviews was conducted in an open style. After the researchers introduced the general objectives of the survey, the interviewees explained the IT system construction and IT staff situation of their respective companies. The interviewees talked about the IT outsourcing risks and corresponding losses they had observed in their workplaces, and then offered their analyses of the likely causes.

If the researchers found that one or more types of risk elements in the theoretical framework (Fig. 2) were not mentioned by the interviewees during the first phase of the interview, the interviewers would propose questions to explore the existence of such risk elements using "Whether" and "What" questions. Then the interviewees would consider and explain the possible causes for a particular risk (i.e. "Why").

After acquiring consent from the interviewees, the interviews were recorded. Each of the researchers took a list of questions built on the model in Fig. 2, to record the opinions of the interviewees toward the risk elements. If the interviewees mentioned any new risk elements and conduction relationships that were not originally included in the model, the researchers would add those to the list.

During the data analysis stage, we followed the theoretical hypothesis method for case studies. To ensure internal validity of our case study, we adopted logic model analysis (i.e. comparing theoretically expected events with observations) and multi-case cluster analysis (i.e. building a general framework that shows data of studied cases respectively) [50]. Also during this stage, we used the coding method of Lichtman [30].

Once the interviews were recorded and transcribed, researchers applied the method of open coding [30]. In order to help the analyst edit the transcript, the text was printed using double spacing so that code ideas and code labels could be written between the lines.

In the first pass-through, the transcripts from the interviews were carefully examined to identify the risk elements (risk factors, risks and losses) they encountered. The theoretically developed framework helped researchers to abstract and distill risk elements from the transcripts.

Three researchers finished their coding individually, recording pages and lines of the transcripts where the risk elements were mentioned (could be more than once) as well as some necessary notes on a spreadsheet. For example, the risk identification table (see Table 1) was completed by each of the three researchers. If a risk element was mentioned by more than one interviewee from the institution, its existence was confirmed.

Following completion of the identification table, the researchers met to discuss their coded tables and to analyze the interview records together. This was particularly helpful when there were differing opinions. A conclusion was typically made following a discussion that resulted in a consensus. If a consensus was not reached, the difference was recorded and the conclusion was attained using a voting mechanism.

Based on the identification of the risks along with theoretical hypotheses, the second stage of the analysis was to identify the conduction relationships between risk factors and risks, and between risks and losses. In this stage, researchers applied the method of hierarchical Axial coding [30]. The codes or labels of risk factors and losses were put into different risks groups. A summary meeting similar to that in the first stage was conducted after the three researchers finished their respective analyses respectively. The results are shown in Tables 2 and 3.

5 Data analysis

5.1 Risks

Table 1 shows the opinions of the two institutions towards the 10 risks we proposed. Both institutions pointed out that the risks of "Vendors have strong positions in outsourcing relationships. Institutions have to accept additional services from them thereby creating more profit for the vendors

Table 1 Investigation results of the risks

Risks	Inst. A	Inst. B	Remarks
R1: excessive dependence on their vendors. Difficult to switch vendors even when they are inefficient	√	√	This risk has happened in both institutions
R2: institutions need approvals of the vendors to change requirement or expand business	√	√	Though both institutions stated that outsourcing service providers won't participate in their decision-making processes, the process is still affected by the provider
R3: providers having stronger positions in outsourcing relationships thereby creating more profit for themselves as the institutions feel obliged to accept their additional services	×	×	Neither of the institutions had been in a situation such as that described in the risk. They believed that their own competitiveness in the marketplace would prevent the service providers from taking such a stance. This then rejected R3
R4: differing opinions on contract terms or management after the relationships are established. Disputes and litigation between the institution and the service provider	√	√	Both institutions claimed this kind of risk happened
R5: idle systems	√	√	Both institutions claimed this kind of risk happened
R6: poor selection of an IT outsourcing service provider	√	√	Both institutions claimed this kind of risk happened
R7: theft of the institution's unique intellectual assets and confidential data by the provider	×	×	Institution A claimed that their unique value proposition prevented this kind of risk from happening Institution B believed that this kind of risk could be restrained by the terms of the contract Institutions A and B thought this kind of risk could be avoided thus rejecting R7
R8: severing the learning and innovation path of the institutions	×	×	With respect to system security, employees from both institutions rarely made innovations on the outsourced IT system. However, this fact did not hamper their employees' learning or ability to make innovations on the institutions' own business. This therefore rejects R8
R9: the outsourcing activity may not be suitable for changing financial and strategic needs, etc.	√	√	Both institutions claimed this kind of risk happened
R10: refusal by the outsourcing provider to adopt new technologies	√	√	Institution A considered this risk to be inevitable in IT outsourcing Institution B also believed to be a risk

Risks **R3**, **R7** and **R8** were the ones proposed in our hypothesis, but proved non-existent after the interviews

(R3)", "Unique intellectual asset or confidential data was obtained by the vendor (R7)" and "Outsourcing severs the path of learning and innovation of new technology pertaining to the institution's business (R8)" had not taken place in their companies.

5.2 Conduction relationship between risk factors and risks

As shown in Table 1, three risks did not exist in the two financial institutions, so we omitted the discussion of the factors and losses related to them. Based on the interviews, the institutions' opinions on "risk factors leading to specific risks" are shown in Table 2.

5.3 Conduction relationship between risks and losses

Table 3 shows the opinions of the two financial institutions on "specific risks generating corresponding losses".

6 Conclusions

First, three types of risks appear to be insignificant in current IT outsourcing at Chinese financial institutions.

According to the interviews, the IT outsourcing projects of Chinese financial institutions may experience limitations such as asset specificity, limited service provider choices and incomplete IT outsourcing contracts. In spite of these limitations, the financial institutions may occupy the dominant position in the relationship, thereby avoiding the situation of "providers having stronger positions in outsourcing relationships, creating more profit for themselves, forcing institutions to accept additional services". This rejected R3.

In the IT outsourcing projects of Chinese financial institutions, external service providers were provided with historical or simulation data in order to protect genuine, real-time data of the institution. There were also clear and strict policies about data security in the outsourcing

Table 2 Investigation results of conduction relationship between risk factors and risks

	Risks	Risk factors	Inst. A	Inst. B	Remarks
H1a	**R1**: excessive dependence on their vendors. Difficult to switch vendors even when they are inefficient	**F1**: asset specificity	√	√	Institution B claimed that inappropriate IT planning and lack of expertise with the IT operation (F8) might lead to R1 (supplemented after investigation, not included in the original hypothesis)
		F2: limited vendors	√	×	
		(**F8**: lack of expertise with the IT operation)	×	√	
H2a	**R2**: institutions need approvals of the vendors to change requirement or expand business	**F1**: asset specificity	√	√	No occurrence of risks related to incomplete contracts (F5)
		F5: incomplete contract	×	×	Institution B pointed out that limited choices of service providers in the marketplace (F2) was a major cause of R2 (supplemented after investigation, not included in the original hypothesis)
		F8: lack of expertise with the IT operation	√	√	
		(**F2**: limited vendors)	×	√	
H4a	**R4**: differing opinions on contract terms or management after the relationships are established. Disputes and litigation between institutions and the service providers	**F3**: uncertainty	×	×	No occurrence of risks related to uncertainty (F3)
		F4: different goals and cultures	√	√	Both institutions claimed that differences in corporate culture/management (F4) and lack of expertise in outsourcing (F7) could be the key cause of this risk
		F5: incomplete contract	√	√	
		F7: lack of expertise with IT outsourcing	√	√	
H5a	**R5**: idle systems	**F3**: uncertainty	√	√	Both institutions affirmed the effect of IT uncertainty (F3)
		F8: expertise with the IT operation	√	√	Both institutions stated that the service providers' lack of business related IT literacy (F8) is an important cause of this risk
					Both institutions stated that a lack of business related IT ability within their own organizations (F8) could lead to the incorrect definition of requirements and improper assessment of the service provider's ability. Thus it could be the cause of this risk
H6a	**R6**: the poor selection of an IT outsourcing service provider	**F6**: information asymmetry	√	√	Both institutions claimed that asymmetric information (F6) could lead to wrong assessment of the service provider, and further cause risk
		F7: expertise with outsourcing	√	√	
		F8: expertise with the IT operation	√	√	Both institutions believed that a service provider's lack of expertise with the IT operation (F8), inefficient outsourcing management and lack of quality outsourcing supervision (F7) might cause this risk
H9a	**R9**: the outsourcing activity may not be suitable for changing financial and strategic needs, etc.	**F4**: different goals and cultures	×	×	Neither institution mentioned differences in goals/culture (F4) or incomplete contract (F5) as a cause of risk
		F5: incomplete contract	×	×	The institutions believed that the mismatching of their IT planning and business strategy could lead to risk (contained in F8, lack of expertise with the IT operation)
		F8: lack of expertise with the IT operation	√	√	The institutions claimed that one of the major constraints when outsourcing decisions were made was the viability of the current system in use (contained in F1, asset specificity) (supplemented after investigation, not included in the original hypothesis)
		(**F1**: assets specificity)	√	√	

Table 2 continued

Risks		Risk factors	Inst. A	Inst. B	Remarks
H10a	**R10**: refusal by the outsourcing provider to adopt new technologies	**F2**: limited vendors	–	√	Institution A claimed that this risk was inevitable, but no further analysis was given
		F4: different goals and cultures	–	√	Institution B concluded that limited choices of service providers (F2) and an imperfect market competition mechanism were the major cause of this risk

In the third column, risks factors **F5** (in risk **R2**), **F3** (in risk **R4**) and **F4**, **F5** (in risk **R9**) were the ones that proved to have no conduction relationship with the risk, therefore our original hypothesis was not confirmed. Risk factors quoted in brackets were the additional ones summarized according to the investigation, but weren't proposed in the original hypothesis

contracts, so that the risk of "theft of the institution's unique intellectual assets and confidential data by the provider" could be avoided. This rejected R7.

Moreover, according to the responses of the financial institutions, leaning of new technologies could be accomplished many ways, and IT outsourcing did not significantly hamper the learning and innovation of the organization. Problems with learning and innovation in Chinese financial institutions were not caused by the lack of proficiency in IT development. This rejected R8.

Because these three types of risk (R3, R7, R8) were rejected by the interviewees of two financial institutions, we could not have an in-depth discussion around the related factors and the losses. Hypotheses H3a, H3b, H7a, H7b, H8a and H8b were neither confirmed nor refuted. This is a limitation of our current case study and these hypotheses will be further explored in future studies.

Second, the impact of most risk factors on risks is confirmed by our case study.

About H1a The interviewees thought that asset specificity and limited selection of vendors could lead to the institution's excessive dependence on their vendors which, in turn, could make it difficult to switch service providers even when they exhibited inefficiency.

The interviewees also believed that if institutions lacked expertise with their own IT operation, they would face the risk of excessive dependence on their vendors. The Interviewees thought that the lack of expertise in IT operations would most likely affect the following areas: technology information gathering before establishing the contract, assessment of the service providers, and understanding of IS/IT properties and IT planning.

About H1b The interviewees agree that the risk of excessive dependence on their vendors would generate a loss of flexibility within the institutions.

About H2a The interviewees confirmed that asset specificity and lack of expertise with IT operation could lead to the risk of "needing the approvals of vendors in order to change requirements or expand business". But the interviewees rejected the conduction relationship between the risk factor of "incomplete contract" and the risk of "needing the approvals of the vendors".

Institution B added that the limited selection of vendors on the marketplace was a major cause of "needing the approvals of the vendors".

About H2b Both of the institutions thought that the risk "needing the approvals of the vendors" would decrease the flexibility of the institutions and weaken the control of the institution. In addition to this, Institution A pointed out that the risk "institutions needing approvals of the vendors to

Table 3 Investigation results of conduction relationship between risks and losses

	Risks	Losses	Inst. A	Inst. B	Remarks
H1b	**R1**: excessive dependence on their vendors. Difficult to switch vendors even when they are inefficient	**L2**: decrease of institution flexibility	√	√	The institutions both recognized the loss of weaken flexibility (L2)
H2b	**R2**: institutions need approvals of the vendors to change requirement or expand business	**L2**: decrease of institution flexibility	√	√	The institutions both recognized the loss of weaken flexibility and control ability (L2)
		L3: weakening of institution control	√	√	Institution A believed that the occurrence of R2 always lead to project extension, which could rise the institution's hidden costs (L1) (supplemented after investigation, not included in the original hypothesis)
		(**L1**: rise of institution cost)	√	–	
H4b	**R4**: differing opinions on contract terms or management after the relationships are established. Disputes and litigation between the institution and the service provider	**L1**: rise of institution cost	√	√	Both institutions recognized rising communication cost and lower efficiency due to this risk, which raised the general cost of the institution (L1)
		(**L3**: weakening of institution control)	√	–	Institution A claimed that ineffective supervision of the outsourcing workers might weaken the control of the institution (L3) (supplemented after investigation, not included in the original hypothesis)
H5b	**R5**: idle systems	**L4**: weakening of institution competitiveness	√	√	Both institutions recognized the rising costs associated with this risk (L1) (supplemented after investigation, not included in the original hypothesis), as well as the decrease in competitiveness from lower working efficiency (L4)
		(**L1**: rise of institution costs)	√	√	
H6b	**R6**: poor selection of IT outsourcing service providers	**L3**: weakening of institution control	√	√	Both of the institutions were aware of the risk of losing control due to uncontrollable outsourcing quality (L3)
		(**L4**: weakening of institution competitiveness)	–	√	Institution B believed that lower service ability would further weaken the institution's competitiveness (L4)
H9b	**R9**: outsourcing activity not suited for changing financial and strategic needs	**L4**: weakening of institution competitiveness	×	×	Both institutions thought that lower decision flexibility (L2) (supplemented after investigation, not included in the original hypothesis) caused by R9 did not have a significant effect on the institutions' competitiveness (L4)
		(**L2**: decrease of institution flexibility)	√	√	
H10b	**R10**: refusal by the outsourcing provider to adopt new technologies	**L1**: rise of institution cost	√	√	Institution A considered this risk to be inevitable in IT outsourcing. They agreed this risk could generate losses, but no further analysis was given
					Institution B claimed that lack of bargaining power would rise the institution's outsourcing costs (L1)

In the third column, losses **L4** (in risk **R9**) were the ones that proved to have no conduction relationship with the risk, and were proposed in our original hypothesis. Losses quoted in brackets were the additional ones summarized according to the investigation, but weren't proposed in the original hypothesis

change requirements or expand business" would lead to project extension and higher institution costs.

About H4a The interviewees confirmed that different goals and cultures, incomplete contracts, and lack of expertise with outsourcing were the causes of the disputes and litigation between the vendors and institutions. Among these three factors, different goals and cultures and lack of expertise with outsourcing were emphasized as more important reasons.

The interviewees did not mention "uncertainty" as a risk factor that had the potential to bring about the same outcome in these institutions.

About H4b The interviewees confirmed that differing opinions on contract terms and management, as well as disputes and litigation between institution and the service provider, could cause inefficiencies which lead to higher institution costs.

Additionally, Institution A claimed that occurrences of this risk might hamper the supervision of outsourcing employees and further lead to weakened control of the institution.

About H5a Both of the institutions confirmed that uncertainty could cause idle systems, and they also emphasized that lack of expertise with the IT operation of their vendors was another important cause of this risk.

Both institutions believed that lack of expertise with IT operations in their own companies would hamper the requirement definition process and assessment of a service provider's ability thereby lowering the efficiency of the institutions.

About H5b Both of the institutions confirmed that idle systems would further decrease an institution's competitiveness.

Additionally, the interviewees thought idle systems and lower working efficiency would lead to rising costs.

About H6a Both institutions confirmed the relationships among information asymmetry, lack of outsourcing management capability, lack of expertise with the IT operation and the poor selection of an IT outsourcing service provider.

It is worth noting that expertise with outsourcing had to do with the provider's ability to perform according to the contract certain tasks that were vital to the outsourcing project, especially under an information asymmetry situation.

About H6b The interviewees verified that poor selection of an IT outsourcing service provider could weaken the control of the institutions, and could also weaken the competitiveness of the institution, since an unqualified vendor could lower the level of service.

About H9a The interviewees did not verify that different goals and cultures or incomplete contracts contributed to the risk of "IT outsourcing cause inability to make changes in financial and business strategy". Instead the interviewees pointed out that "IT planning capabilities not matching the business development" would be the main factor causing this risk. They also believed that the lack of expertise with IT operations could cause this risk as well.

Both of the institutions claimed that the major constraint when outsourcing decisions were made was the viability of the current system in use. This supported the conduction relationship between asset specificity and the risk of "Outsourcing activity not suited for changing financial and strategic needs".

About H9b Both institutions agreed that if IT outsourcing could not be suitable to the changing financial and strategic needs, this risk would decrease the flexibility of the institution. They did not, however, think it would significantly affect the competitiveness of the institutions.

About H10a Limited selection of vendors and differing goals and cultures were considered by Institution B as the major causes of the risk "refusal by the outsourcing provider to adopt new technologies".

About H10b Though it was not explained in detail by Institution A, both Institution A and B confirmed that "service providers refusing to adapt new technologies" was an inevitable risk in current IT outsourcing projects of Chinese financial institutions. This risk may cause a rise in the institution's outsourcing costs.

Institution B emphasized that a limited selection of vendors created an imperfect market competition mechanism which led to reduced bargaining power and higher outsourcing costs for the institutions.

Third, the case study has augmented the original theoretical framework with newly discovered effects of risk factors. The new theoretical framework is shown in Fig. 3.

7 Discussion

Three of the eight risk factors in this study deserve to be further emphasized.

First is the Chinese financial institution's lack of expertise in IT operations. This lack of expertise reflects the shortage of their long-term IT planning ability.

Our investigation shows that the success of an outsourcing project is highly related to the IT expertise and strategic planning capability of the financial institution itself. Both institutions we interviewed expressed that their lack of comprehensive IT planning and business strategy were the major factors constraining the improvement to these institutions' IT outsourcing. Without a clear, long-term IT plan and business strategy, how could the institutions require the service provider to build an open IT infrastructure suitable for future use? Therefore, bringing in competent people with both business and IT/IS planning abilities to enhance IT planning capacity is the only way for financial institutions to reduce the risk of losing control in a long-term IT outsourcing practice. The lack of IT operation expertise in financial institutions is also reflected by their lack of ability to collect technical information, assess providers and understand IS/IT projects before an IT outsourcing contract is established. Unfortunately, shortage of talent and experience is a major problem in China.

Second, there are differences in goals and corporate cultures between Chinese financial institutions and their IT outsourcing providers. These differences can be mitigated

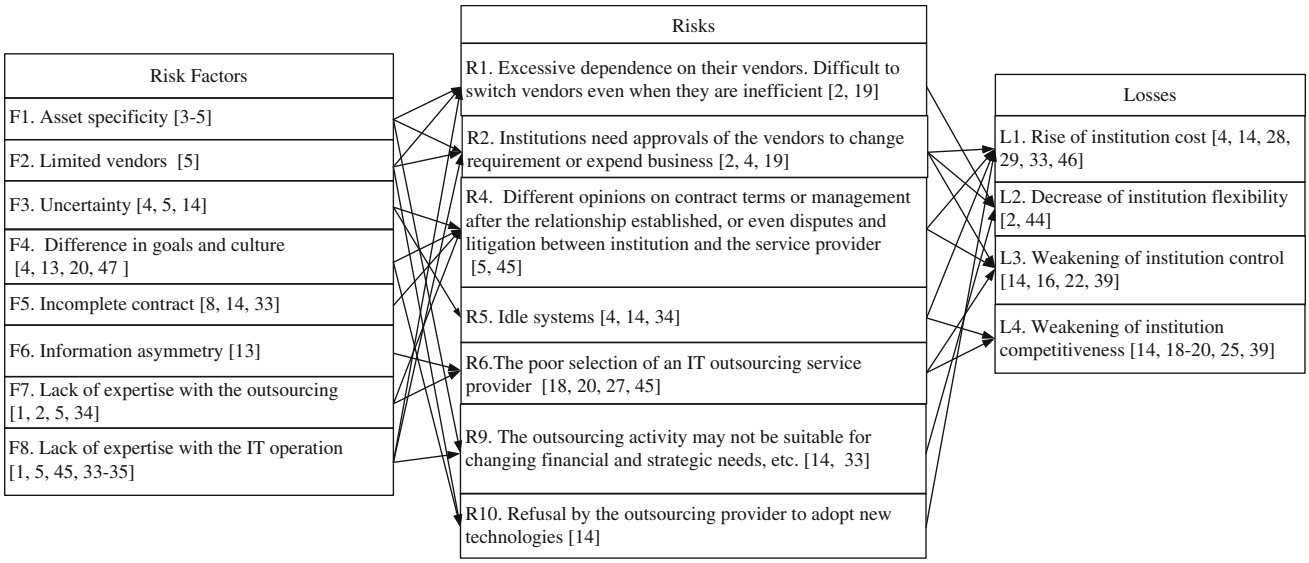

Fig. 3 The new framework of risk elements and their conduction relationships in financial institutions' IT outsourcing

by improving the literacy of IT outsourcing management in these institutions.

As separate economic entities, outsourcing service providers have interests conflicting with financial institutions' (clients). It is possible that a service provider may sacrifice the benefit of its client to make its own profit. There could also be different working methods, habits and attitudes between the two parties due to different corporate cultures. Different goals and cultures of the companies may lead to conflicts and increase the communication costs. So improvement in outsourcing expertise for both parties is beneficial for control of communication costs. IT outsourcing expertise of a financial institution includes both the ability to establish the outsourcing strategy and the ability of management to implement the strategy (i.e. the ability to establish an outsourcing contract, to solve and negotiate possible conflicts, to manage and supervise the provider's employees, its financial situation, its service quality, and its knowledge management during the outsourcing process). Therefore, improvement of self- expertise on outsourcing is the fundamental approach to solve the conflicts during IT outsourcing.

Third, there is not a wide enough selection of mature IT outsourcing service providers for the financial institutions in China.

Another risk factor that the two financial institutions both emphasized during our interviews is the limited selection of service providers in the marketplace. According to these institutions, the IT outsourcing market in China is an oligopolistic market dominated by several providers. This oligopoly hampered the financial institutions from securing their own interests. This suggests that the market development of China's outsourcing industry requires further perfection. A more competitive environment is needed to improve the situation of financial institutions that rely on IT outsourcing providers.

Even with a limited selection of IT service providers, choosing the right one is still a challenge. Although a large proportion of IT outsourcing risk management literature involves assessment of providers' capabilities, empirical guidance from these studies is still lacking. Success in similar projects is often the only tangible basis in the assessment of the provider, while other factors such as size, financial position, employee turnover ratio are not discussed in current studies or yet utilized by financial institutions.

These three risk factors are the most significant ones faced by Chinese financial institutions during their IT outsourcing practices when compared with their equivalents abroad. The Chinese financial institutions' demand for IT service providers is growing as rapidly as China's economy, but local capabilities of the service providers did not match the financial institutions' business development. In order for the Chinese financial institutions to improve risk management in IT outsourcing, they should improve their outsourcing and business related IT literacy.

8 Research contribution and limitation

With the development of China's economy, Chinese financial institutions are facing a lot more complicated business situations than ever, and their IT outsourcing need is expanding rapidly [9]. However, the IT outsourcing practices and management of Chinese financial institutions,

compared with their foreign counterparts, are still at a primary stage and contain a multitude of risks.

One of our major contributions is to distinguish risk factors and risks with a theoretical framework, rather than confusing the two as in many previous studies. Based on this distinction, a risk conduction model of financial institutions' IT outsourcing is built. The model reveals the risk factors faced by Chinese financial institutions during their IT outsourcing practices and explains the causes and pathways of how different risk factors can lead to specific risks and, in turn, how these risks can result in losses.

The findings of this paper may be used by financial institutions to uncover the initial factors leading to risks and losses, and aid them in proactively preventing similar risks and losses in their own marketplaces. The case study in this paper supplements the shortage of empirical studies on IT outsourcing management, especially studies of IT outsourcing risk in developing countries.

One limitation of this paper is that only two cases are included in our investigation. In future research, we will study financial institutions in different business categories. We will modify the risk conduction model to suit different business types and IT outsourcing patterns.

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