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Risk Assessment of Implementing Food Safety Platform in N City

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Abstract

The research of the school of Business Administration of Munich University of science and technology shows that only half of the scientific and technological R & D projects from 2005 to 2008 have been successful. 48 % of science and technology projects have serious defects, of which 30 % are overdue and 10 % are seriously overspent. 20 % of science and technology projects were suspended before their development was completed. Half of the projects have significant deviation from the original estimate in time schedule or budget, or obvious quality problems (Xuan, 2016).

In today's business world it is important for every organization to have a well-defined project management process and to follow that process strictly to achieve the best result. It is also very significant to pursue a well-recognized method to run IT projects successfully. Moreover, a well-organized IT project development framework helps a company to improve its productivity as well as the business competitiveness and provide better services for their customers.

But it is impossible to have 1 process for all type of IT projects like ERP (Enterprise Resource Planning), sourcing, HR (Human Resources) and so on. Depending on project size and others criteria, organizations choose agile, waterfall or other models to complete their projects.

It is hoped that the research results of this paper can provide reference for the risk management of similar digital innovation projects such as smart city platform in China in the future.

Keywords: Risk assessment, Risk analysis, Food safety platform, Supervision, SEI system

Introduction

With the rapid development of information technology, informatization has gone deep into all aspects of enterprise operation. There are more and more functions of software and the complexity of development is higher and higher. A software project often needs the cooperation of multiple people or teams to complete. Collaborative development not only improves the efficiency and scale of software development, but also greatly improves the risk of software project development. In the development stage of a field, there are generally many problems, and the field of software project development is no exception. According to statistics, the failure risk and uncertainty of large-scale software projects are much greater than expected by ordinary people. In the implementation of the project, the execution of each task has the risk of deviation from the plan. These risks can be transmitted and accumulated among the software project teams, and ultimately affect the risk level of the whole project.

The research of the school of Business Administration of Munich University of science and technology shows that only half of the scientific and technological R & D projects from 2005 to 2008 have been successful. 48 % of science and technology projects have serious defects, of which 30 % are overdue and 10 % are seriously overspent. 20 % of science and technology projects were suspended before their development was completed. Half of the projects have significant deviation from the original estimate in time schedule or budget, or obvious quality problems (Xuan, 2016).

The study on large scale it projects conducted by McKinley & Company and Oxford University in 2012 on 5,400 large-scale IT projects showed that 17 % of large-scale IT projects deviated so as to threaten the survival of the company, 5 % exceeded the budget, 7 % were overdue and 56 % did not achieve the expected benefits. In view of the particularity of continuous maintenance and change in software projects, IBM has investigated 1,500 managers, of which 40 % of the projects can meet the quality requirements on time and budget; 32 % of the projects lack experienced management team support; 35 % of the projects have insufficient complexity estimation; among the companies participating in the survey, the difference in project success rate between the best and worst companies is as much as 10 times (Xuan, 2016).

According to National Institute of Building Science PM Solution of Project Management Institute Inc. illustrates that on average 37 % of projects failed each year. They also mention 5 reasons for why projects failed which are related to poor requirements, managing resources, impractical schedules, weak planning and unrevealed risks. To become successful in IT project development, it's important to have a clear idea on these 5 failure issues and to take necessary steps to overcome it.

In today's business world it is important for every organization to have a well-defined project management process and to follow that process strictly to achieve the best result. It is also very significant to pursue a well-recognized method to run IT projects successfully. Moreover, a well-organized IT project development framework helps a company to improve its productivity as well as the business competitiveness and provide better services for their customers (Tian, 2019).

As food safety is important for people hearth in daily life and China is one of the largest food manufacturers, therefore the implementation of food safety supervision platform effectively can be reduced the food safety problems. With the advent of the era of big data and cloud computing, based on the current situation of China's food safety supervision, it is the only way which must be passed for social development to open food supervision information and build a public platform for food safety supervision. In this paper, we aim to analyze and assess the risk of implementing food safety management system in N city, Guangxi, China.

The common problems of informatization projects are 1) The software project cannot be delivered on time and the cost exceeds the budget; 2) The requirement specification is always changed again and again; 3) The change of personnel has a great impact on the organization; 4) High maintenance cost; 5) The maintenance cannot be completed within the time expected by customers, resulting in customer complaints; 6) Poor portability of software; and 7) The reusability of software is poor.

As the risk is intangible, also it is objective at the same time. As a part of production activities, it is unavoidable. Now we have entered the era of informatization and digitization. To promote economic development and ensure the healthy development of enterprises, informatization and digitization projects should not only be vigorously promoted, but also be built on the basis of stability and controllable risk.

This paper cites the basic theory of digital project risk management, and takes the digital food safety supervision cloud platform project as a case, applies SEI risk management system to identify, analyze and evaluate the risk of digital engineering project, and gives practical countermeasures.

It is hoped that the research results of this paper can provide reference for the risk management of similar digital innovation projects such as smart city platform in the future.

Typical models of software project risk management include Boehm's software risk management system, Charlette's risk analysis and management system, SEI risk management system of Software Research Institute of Carnegie Mellon University and Leavitt risk management system.

Barry Boehm software risk management model

Barry W. Boehm, a famous American software engineer, published an article "software risk management: Principles and practices" in IEEE software in 1991. This paper expounds the thought system of software risk management, which divides the concrete practice of risk management into 2 main measures: Risk assessment and risk control.

As the pioneer of software project risk management research, the core idea of Boehm model is the list of 10 risk factors. Risk management is divided into 2 parts: Risk assessment and risk control. Risk assessment includes risk identification, risk analysis and risk priority allocation, while risk control includes risk plan, risk response and risk tracking. When implementing a software project, it is generally necessary to list the 10 risk factors that can most affect the project, then evaluate these risk factors respectively, and then carry out risk planning, risk tracking, risk control and other activities. In the follow-up activities, the solutions of the top 10 risk factors shall be checked repeatedly. With the progress of the project, a new list of the top 10 risk factors shall be listed continuously, and the cycle shall continue until the end of the project.

Boehm defines risk by the following formula;

$$RE = P(UO)\times L(UO)$$

P(UO) represents the probability of risk occurrence, and l (UO) represents the impact of risk occurrence on the project.

As a pioneer, Boehm laid the foundation for the research of software project risk management. The theory and model he put forward still have extremely important guiding significance for our current software risk management. Moreover, compared with his model, the cost of implementation is relatively low, and it is fast, effective, convenient and feasible in some small-scale projects, but the deficiency of this model is Many detailed risks with low priority are omitted, and no specific quantitative method of risk identification is proposed.

Table 1 Boehm Top 10 risk identification list.

Risk projects	**Risk management skills**
Lack of personnel	Actively carry out talent recruitment and team building
Unrealistic schedule and budget	Make detailed cost and time budget in advance
Software function development error	Organization analysis and task analysis
Develop wrong user interface	Task analysis; prototype; scene analysis;
Unclear requirements	Detailed requirements; prototype
Changing requirements	Information hiding; incremental development
Incomplete equipment parts	Inspection; perform compatibility analysis
Outsourcing task error	Tracking inspection; optimization design;
Insufficient execution	Incentive; modularization
Insufficient computing power	Technical analysis; algorithm analysis; cost benefit analysis; prototype

Source: Sun (2011)

Risk assessment mainly includes the following 3 aspects;

1) Risk confirmation: List the relevant risk factors that may lead to the failure of the project in the form of checklist.

2) Risk analysis: Assess the probability of occurrence of the above risk factors and the possible loss scale after the actual occurrence of the risk item by item, and consider the scale linkage effect after the combination of multiple factors and the interaction of multiple factors.

3) Priority Division: Priority list of the above factors that have been confirmed and analyzed.

Risk control mainly includes the following 3 aspects;

1) Management plan: To solve or control each risk factor through information collection, risk avoidance, risk transfer and other measures. The management plan should include the coordination and overall grasp of all risk factors.

2) Solution: Eliminate or solve risk factors through prototype testing, simulation operation, performance evaluation, personnel arrangement and cost oriented design.

Boehm provides many related implementation technologies for each activity. For example, in risk identification, a list of 10 software risk factors is given, and relevant treatment opinions and methods for each factor are also recommended. Starting from the list, managers and technicians can further refine the risk factors, evaluate and resolve them.

According to Boehm's software risk management system theory, software risk management is to use some feasible principles and practices to control the risks that affect the success of the project. The goal of software risk management includes identifying, describing and eliminating risk factors in advance, so as not to let risk affect the success of software project, lead to rework or failure of software project.

3) Implementation and monitoring: Including tracking the progress of eliminating project risk factors, and making corresponding adjustments according to the actual implementation.

Boehm's software risk management theory summarizes the 10 common risk factors in software projects, and gives the corresponding guidance for these factors one by one. Based on Boehm's model, this paper analyzes the NVR software platform of N company's actual software project, and summarizes the risks existing in the software project into 4 aspects: Schedule Management, quality management, configuration management and cost management concrete analysis and practice.

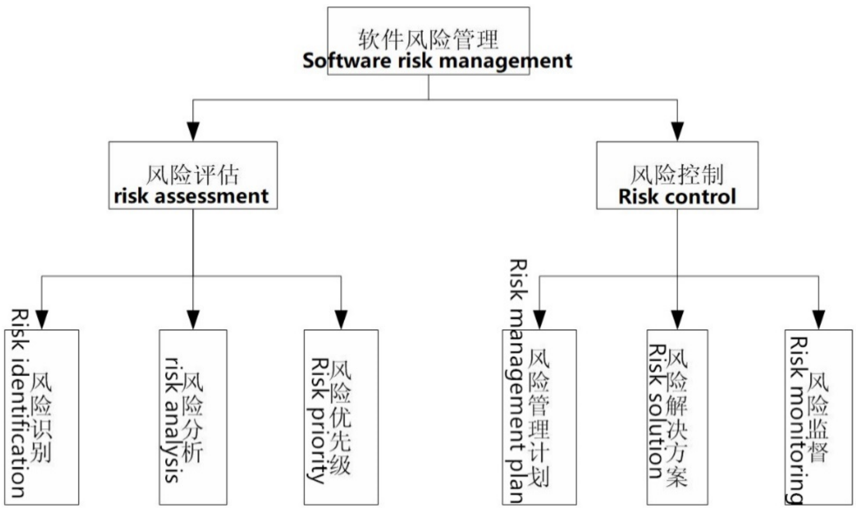

Figure 1 Boehm's software risk management theory.

SEI's CRM model

SEI's CRM model, the whole life cycle of the project should continue to carry out risk management, from the start of the project to the end of the project, risk identification should continue in the project, risk management is also a continuous process. There are 5 steps in this model, as shown in **Figure 2**. The core of the whole model is communication. Good communication with all stakeholders during project R&D can make risk control and management more practical and effective.

Figure 2 SEI Framework model of continuous risk management
Source: Ahern et al. (2009).

Charette's IT risk management model

Charette's IT risk management model was proposed by Charette in 1989. Charette divides risk management into 2 stages. Each stage has 3 specific processes, of which the related parts are interrelated and not independent. Charette's theory embodies the management ideas, methods and specific technologies for these processes. These 2 stages are risk analysis and risk management. Risk analysis is divided into risk identification, estimation and evaluation, and risk management is divided into risk planning, control and supervision. This risk management model is usually realized through some monitoring indicators, which is more visible.

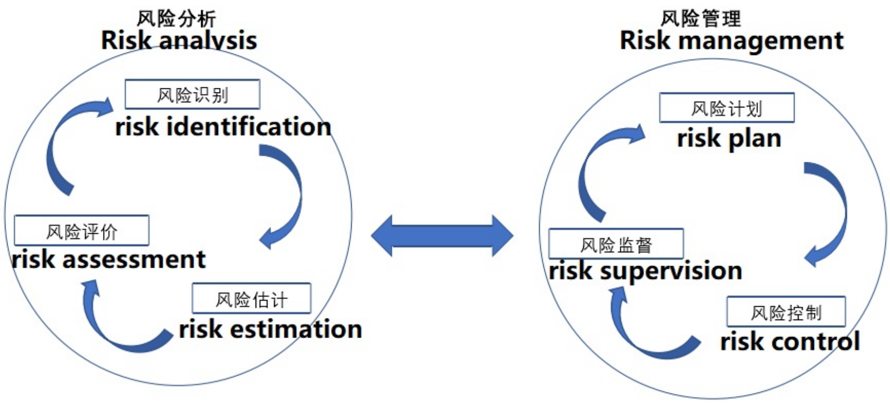

Figure 3 Charette risk management model.
Source: Tian (2019)

Charlette thinks that it risk must be formed in a certain practice, and the occurrence of loss is uncertain. Risk will affect the final result, and loss will be attached to practice. Charlette model attaches great importance to the risk of personnel. Charlette model believes that project related personnel have a great impact on the design and implementation of the project, and project related personnel also have a great impact on the implementation risk of the project. It projects have always been knowledge intensive projects. In knowledge intensive projects, many high-tech project personnel are usually gathered, so the risk of the project will inevitably involve the factors of technical personnel. Technical personnel are not good at communication, and some of them are affected by their personality. They often only report good aspects and do not report problems, which will lead to further improvement of the problem It's getting worse.

Although the IT project management system is biased, there are some problems in IT project management system. In addition, it is necessary to establish a high-level IT project management system.

From the perspective of project process, Charlette model also pays enough attention to the project process, and has corresponding regulations on the supervision, supervision and risk resolution of problems in the process. M company's customized IT projects fully consider the interests of the demanders, and involve more complex subject knowledge. In the process of project implementation, it needs the cooperation of computer, electronic technology, monitoring and other fields. Past practice has proved that the more interfaces, the greater the risk, system integration must ensure timeliness, which also poses a challenge to project management. Charlette model is an important way to solve these problems.

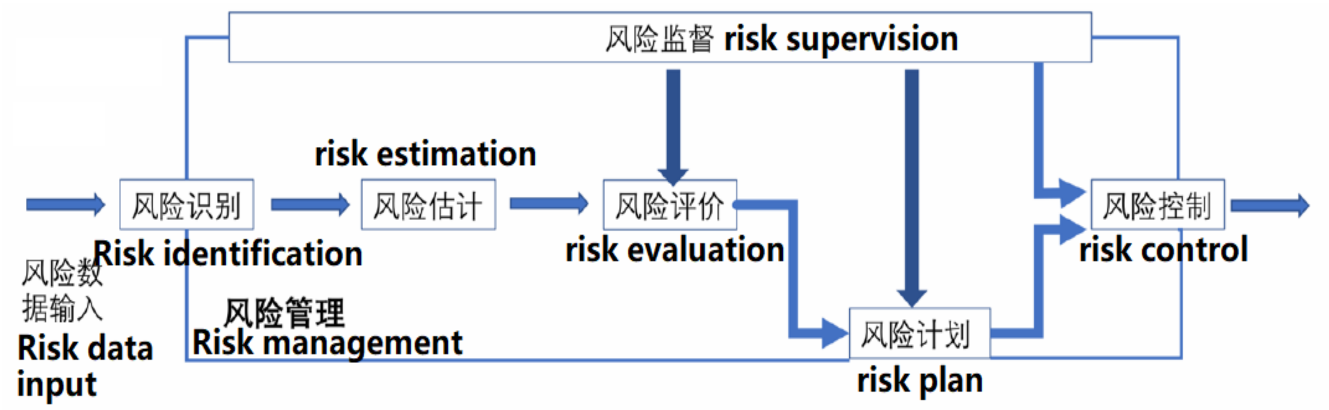

Figure 4 Risk management process.

Leavitt model

Application of Leavitt model: The 4 components of Leavitt model: Role, structure, task and technology are closely related to the progress and quality of the project. **Figures 2 - 4** shows the relationship between each part.

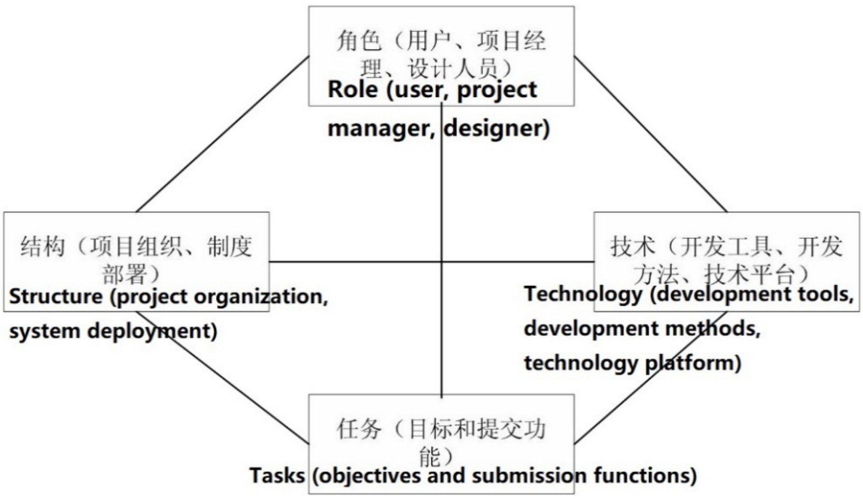

Figure 5 Leavitt risk management model.

In **Figures 2** and **3**, roles represent project participants, such as project manager, project team members, etc. Among them, the ability of project team members to complete tasks, master technical level, the ability of project manager to assign tasks and the tendency to optimize work may bring risks to the project.

The structure mainly includes normative level and behavioral level. Normative level, such as values and norms; Behavior level, such as personnel communication, actual behavior mode of work, etc. The imperfect organizational structure will affect the project progress and quality, and even whether the project can be delivered on time.

Technology includes development tools, methods, hardware and software platforms.

The project team shall select appropriate, mature and familiar technologies for development according to the actual situation of the project; The unsuitable organizational structure under the specific technical environment and the unsuitable technology under the specific organizational structure environment will bring risks (Guo, 2012).

Methodology

Risk assessment method using CMMI risk model (foreign literature)

Risk factors and ERP project lifecycle: This sub-section describes the second aspect of our analysis and aims at setting he risk factors back in the ERP project lifecycle. This enables to highlight the way they have to be managed (all along the project lifecycle or at some particular stages). Some risk factors can be associated to one of these phases, as they have to be managed at this specific phase; they are called “vertical risk factors” and are quoted VRx in **Figure 3**.

Others have to be managed all along the project lifecycle; they are called “horizontal risk factors” and are quoted HRx in **Figure 6**.

The CMMI risk management model is shown below.

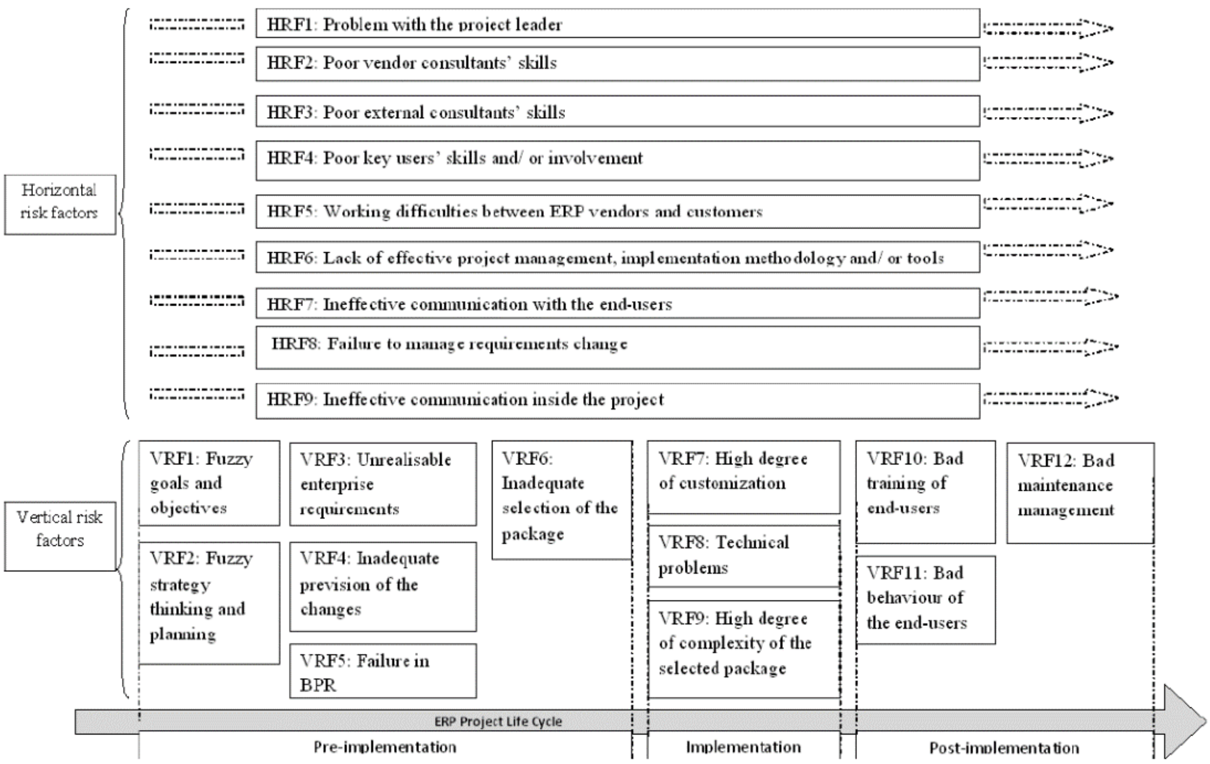

Figure 6 Risk factors in the ERP project lifecycle.

In **Figure 3**, the columns correspond to the risk factors, respectively HRFx and VRFx. The lines represent the risks (Rx), pooled in 3 groups: (i) risks that can be either residual of the "project" misalignment risk or from which the "project" misalignment risk can be a residue; (ii) risks corresponding to the "project" misalignment risk, and (iii) risks that are the residues of the "project" misalignment risk.

		HRF1	HRF2	HRF3	HRF4	HRF5	HRF6	HRF7	HRF8	HRF9
Residual risk of the MR/ risk from which the MR is residual	**R2**	X	X	X	X	X	X		X	
	R3	X	X	X	X	X	X	X	X	
"project" Misalignment risk (MR)	**R4, 5, 6**	XX	XX	XX	XX	XX	X		X	XX
Residual risk of the MR	**R7**	X	X	X	X	X	X	XX		

x: proposed link, to be validated xx: link emphasized in the literature

Table 2 Links between the "project" misalignment risk and the related risk factors.
Source: Mamoghli et al. (2018)

Risk assessment method using Boehm software risk model (foreign literature)

The Risk Point (RP) metric was developed aiming a simple objective, in just 1 value, represent the overall risk exposure level of a project. Basically, the metric is defined in ts of the amount of identified risks, where these risks are defined in terms of its probability and estimated impact, thus the concept of risk exposure (RE) (Wanderley et al., 2015)

$$RE(Risk) = Probability\ (Risk) \times Impact\ (Risk)$$

As a starting point for defining the Risk Point metric, it was used the same idea that was applied in the Use Case Points metric (UCP). That technique proposes a way to quantify the size of the whole project based on the defined Use Cases and other technical and environmental factors.

Summarizing, by using the UCP, it is possible to define a single value to represent the project, based on the Use Cases and others technical and environmental factors of the project (Wanderley et al., 2015).

The weights used in Risk Point were defined based on interviews with students of a software project management course and others software management professionals (Wanderley et al., 2015).

Similarly, the Risk Point metric allows quantifying the project in terms of its identified risks. It is necessary to estimate the Risk Exposure value, i.e. Probability versus Impact, for each identified risk, so, for a specific data collection about the current risks of a project, it is possible to determine a value of Risk Point (RP), as follows;

$$RP = PCF \times URPW$$

where, PCF is the Project Characteristics Factor and URPW means Unadjusted Risk Point Weight.

PCF is a value for giving the project a weight and adjust the metric final value based on technical and environmental factors. This value is defined through the answers of a questionnaire, which was developed from an empirical study with software project managers and management students, as mentioned. Then, PCF is defined as;

$$PCF = 1.05 + (0.015 \times CF)$$

CF means Characteristic Factor, it's determined by answering the 8 questions of the questionnaire with scores between 0 and 4, and then this answer is multiplied by the defined weighted value for each question. Finally, these 8 products are summed, resulting in the CF value;

$$CF = \sum_{i=1}^{8} (Question_i \times Weight_i)$$

Once the CF value is defined in the interval [0,39.48], it means that the PCF occurs in the interval [1.05, 1.6422].

URPW is the Unadjusted Risk Point Weight, composed by the identified risks during the data collection, in terms of their Risk Exposure as defined in Eq. (1). In this study, the estimation adopted was values in {0.1, 0.2, … ,0.9}.

The Unadjusted Risk Point Weight (URPW) value is formed by the summation of the weights of each identified risk, being this Weight defined according the Risk Exposure value, as can be seen in the following table.

Table 3 Unadjusted Risk Point Weight (URPW) values.

Classification	RE(Risk)	Weight(Risk)
Very Low	[0.0, 0.2)	1
Low	[0.2, 0.4)	2
Average	[0.4, 0.6)	3
High	[0.6, 0.8)	4
Very High	[0.8, 1.0]	5

Thus, for n identified risks, the URPW value follows this rule;

$$URPW = \sum_{i=1}^{n} Weight(Risk_i) \mid n = number\ of\ identified\ risks$$

Source: Wanderley et al. (2015)

Construction of judgment (pairwise comparison) matrix

The risk assessment of R smart food safety platform project is conducted from 2 aspects: The possibility of project risk and the impact of risk on the project. The possibility of project risk occurrence is mainly scored from 5 categories; highly likely, likely, unlikely, less likely and unlikely. The impact of risk occurrence on the project is mainly scored from 5 categories; high impact, high impact, medium impact, low impact and very low impact. The final result is obtained after comprehensive scoring.

The following steps shall be taken for expert scoring: Firstly, select experts who understand the construction process of information platform and have many experience in government software project construction, usually experts who are familiar with risk management knowledge from the project developer, project supervisor and computer technology professional field. Finally, 3 experts were invited from R Smart City Investment Management Co., Ltd., R market supervision and administration information center, LC software company and information security evaluation company to score the risk assessment of R smart food safety project. Secondly, experts compare and assign values to all risk factors in the following risk matrix **Table 4**. The 12 experts are independent of each other and there is no discussion.

Table 4 Total risk judgment matrix of R smart food safety platform project.

R市智慧食安平台项目总风险判断矩阵
Total risk judgment matrix of R smart food safety platform project

项目总风险 Total risk	政策与战略风险 Policy risks	管理风险 Management risk	安全风险 B3 Safety risk	技术风险 B4 Technical risk	人员风险 B5 Personnel risk
B1 政策与战略风险 Policy risks	1	1/4	3	3	3
B2 管理风险 Management risk	4	1	4	3	3
B3 安全风险 Safety risk	1/3	1/4	1	1	1/4
B4 技术风险 Technical risk	1/3	1/3	1	1	1/4
B5 人员风险 Personnel risk	1/3	1/3	4	4	1

Source: Liu (2020)

Risk assessment method using CMMI risk model (domestic literature)

As shown in following **Table 5**, the risk assessment and management table identifies 10 Risk Sources and 6 Risks Category; Set the Risk Probability of each risk.

Table 5 Risk assessment and management form.

Table 2.6 风险评估与管理表
Risk assessment and management form

	风险来源 Risk Sources	风险类别 Risks Category	风险可能性 Probability	风险结果 Results	风险系数 Coefficient	同类别风险系数 Similar risk coefficient	极限值 Limit value
1	规模估计可能非常低 Small scale	产品/项目规模 Project scale Risk	20%	3.6	0.72	1.08	1.32
2	复用程度低于计划 Reuse degree is low		30%	4.2	1.26		
3	用户需求频繁变动 Changing requirements		60%	2.1	1.26		
4	用户对系统消极态度 Negative user attitude	商业风险 Business Risk	40%	3.5	1.4	1.3	
5	交付期模糊 Fuzzy delivery date		50%	2.4	1.2		
6	资金不足 Insufficient funds	客户特性风险 Users Rsk	40%	4.9	1.96	1.96	
7	技术达不到预期 Insufficient technology	建造技术风险 Technical Risk	30%	1.1	0.33	0.33	
8	缺少对工具的培训 Lack of training on tools	开发环境风险 Environmental Risk	60%	3.2	1.92	1.92	
9	项目人员缺乏经验 Lack of experience	人员数目与经验风险 Personnel and experience Risk	30%	2.6	0.78	1.35	
10	项目人员流动过于频繁 Frequent personnel turnover		60%	3.2	1.92		

As shown in following **Table 6**, it is assumed that risk is affected by 4 factors: Performance, support, cost and schedule Combined impact. Set the risk impact and risk severity of each risk according to definition 3 Risk results for risk 1.

Table 6 Calculation results.

风险结果 Calculation results				
风险编号 No.	风险因素 Factors	风险影响 Influence	风险严重性 Seriousness	风险结果 Results
1	性能 performance	0%	0	3.6
	支持 supports	20%	2	
	成本 costs	40%	4	
	进度 progress	40%	4	

Source: Jin (2010)

Calculation of risk assessment

In July 2019, my company reached the cooperation to implement the food safety supervision platform with Food and Drug Administration (FDA) in N city. As the project manager of the implementer, I led the implementation of the project and evaluated the risk in real time.

This digital food safety supervision project risk assessment adopts online questionnaire inquiry method. The design of the questionnaire was drafted by Nanning SOHO Financial Consulting Service Co., Ltd. and revised by the investigation team of Nanning SOHO Financial Consulting Service Co., Ltd. the test survey was conducted in September 2019, the first formal survey was conducted in October 2019, and the second formal survey was conducted in early 2021 based on work needs. A total of 2 surveys were completed.

The following steps shall be taken for expert scoring;

Firstly, select experts who understand the construction process of information platform and have many experience in government software project construction, usually experts who are familiar with risk management knowledge from the project developer, project supervisor and computer technology professional field. Finally, 3 experts were invited from R Smart City Investment Management Co., Ltd., R market supervision and administration information center, LC software company and information security evaluation company to score the risk assessment of R smart food safety project.

Secondly, experts compare and assign values to all risk factors in the following risk matrix **Table 2**. The 12 experts are independent of each other and there is no discussion.

In the process of risk qualitative analysis, the triple【$\mathbf{R_i}$, $\mathbf{L_i}$, $\mathbf{X_i}$】is used to describe the risk. Where $\mathbf{R_i}$ is the Risk Value (Risk Evaluation Result), $\mathbf{L_i}$ is the probability of risk occurrence (as shown in table 3.6), $\mathbf{X_i}$ is the impact of risk (as shown in table 3.7), I = 1, 2, ... N is the risk serial number, indicating that there are relevant risks in the project.

Independent Variable: Probability of occurrence (Li), Degree of impact (Xi)

Li is the probability of risk occurrence

Xi is the impact of risk, I = 1, 2, ... N is the risk serial number.

Ri is the Risk Value（result） $Ri = Li \times Xi$

Table 7 Values of risk occurrence probability **(L_i)**.

Possibility of occurrence	Probability of possibility	Probability Value (L_i)
Very high	more than 90 %	$L_i > 0.9$
High	more than 70 %, less than 90 %	$0.7 < L_i < 0.9$
Medium	more than 30 %, less than 70 %	$0.3 < L_i < 0.7$
low	more than 10 %, less than 30 %	$0.1 < L_i < 0.3$
Very low	less than 10 %	$L_i < 0.1$

Table 8 Risk impact severity score table **(X_i)**.

Influence	progress	Cost	Quality	(X_i)Value
Disaster (Extremely high)	The delay was more than expected 20 %	Cost over budget more than 20 %	The delivered products cannot meet the requirements at all	$X_i > 0.9$
Significant (high)	The delay was 11 to 20 %	Cost over budget 11 to 20 %	The product delivered is not recognized by the customer	$0.7 < X_i < 0.9$
Medium (medium)	The delay was 6 to 10 %	Cost over budget 6 to 10 %	The delivered products are basically not recognized by customers, and need to be recognized by the main customer groups	$0.3 < X_i < 0.7$
Slight (low)	The delay was 1 to 5 %	Cost over budget 1 to 5 %	The very demanding parts of the delivered products are affected	$0.1 < X_i < 0.3$
Very slight (very low)	The delay was less than 1 %	Cost over budget less than 1 %	The impact on the quality is slight and imperceptible	$X_i < 0.1$

Table 9 Risk value **(R_i)** level table of software system project.

Probability harm	Very high (0.9)	High (0.7)	Medium (0.5)	low (0.3)	Very low (0.1)
Disaster (0.9)	**0.81**	**0.63**	**0.45**	**0.27**	**0.09**
Significant (0.7)	**0.63**	**0.49**	**0.35**	**0.21**	**0.07**
Medium (0.5)			**0.25**	**0.15**	**0.05**
Slight (0.3)			**0.15**	**0.09**	**0.03**
Very slight (0.1)			**0.05**	**0.03**	**0.01**
Risk Level: $R_i \geq 0.6$ High Risk, $0.3 < R_i < 0.6$ Medium Risk, $R_i < 0.3$ Low Risk					

As the object of the project implementation is administrative institutions, the total number of personnel participating in the implementation and external evaluation is not more than 46, and the sample size is set to be more than 40 according to the research of 5 experts.

In 2021, the actual sample size is 40. This paper uses the latest survey results of 2021. In the selection of survey objects, the article covers all the implementation roles of the owner, the implementer and the consulting company, covering more than 90 % of the participants.

Finally, the survey team members of Nanning SOHO Financial Consulting Service Co., Ltd. verified the survey results by telephone (invite to participate in scoring) and online questionnaire.

The data instrument used to collect data in the research was a 2-part questionnaire. The first part contained the respondents' working position. The second part contained 6 aspects of risk assessment questioning: 1) Demand risk (A1); 2) Technology risk (A2); 3) Organization risk (A3); 4) User Risk (A4); 5) Team Risk (A5); and 6) Control Risk (A6). Each aspect of risk consisted of 4 items totaling to 24 items in this questionnaire. The responses were evaluated based on the Likert scale from 1 (strongly disagree to 10 (strongly agree).

This questionnaire was piloted with some specialist, and validity and reliability analysis was performed. The IOC value demonstrated 0.71 and its Cronbach's alpha was 0.635 (The website of online questionnaire inquiry, 2021).

After scoring the project risk elements, the expert group members refer to the risk probability measurement **Table 4**, the risk impact level **Table5** and the risk level matrix **Tables 4 - 6**, combined with the list of project risk identification results in **Table 7**. According to the scores given by the project expert group members, the project manager needs to further deal with these scores.

Risk matrix:

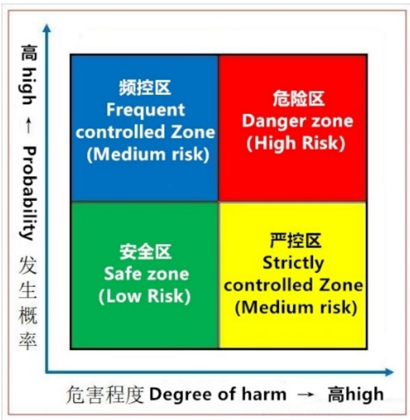

Figure 7 Risk matrix in food safety project.

Risk impact and response in each zone for Risk matrix:

1) Danger zone (high risk). The probability of occurrence is high and the degree of harm is high. It is necessary to avoid the risk factors of all implementation events belonging to the region. The region must be strictly predicted by qualitative and quantitative technology, and the prediction is only used as a reference for the implementation steps.

2) Safe zone (low risk). The probability of occurrence is low, and the degree of harm is low. This area can be predicted by the common time series technology (complex points can be predicted by the combination of time series + regression analysis + qualitative technology, and the prediction can be used as the basis for daily implementation work.

3) The yellow area is strictly controlled zone (medium risk). The probability of occurrence is low and the degree of harm is high. Yellow is the warning color. Although the probability of occurrence in yellow light area is low, once it occurs, it will bring great harm. For the yellow light area, my suggestion is to communicate with all parties to shorten the lead time and turnover cycle as much as possible (if necessary, certain resources may be invested or concessions may be made in the negotiation), so as to

avoid the occurrence of risk events with low probability and high harm. Then, the time series technology is used for basic prediction and artificial judgment.

4) Blue area (frequency-controlled zone (medium risk)). The probability of occurrence is low, the degree of harm is high, the efficiency of blue light area is high, but the harm is small, so we can take the “diligent” strategy. At the same time, the rapid response mechanism should be established to enhance the ability of rapid response and avoid the increase of risk and harm degree of implementation events.

Results and discussion

After the questionnaire is collected, according to the average and standard deviation of the survey results, the experts analyzed the deviation of the score of project risk influencing factors. Through questionnaire, brainstorming and project seminar, the risk assessment form of this project is as follows.

According to the average and standard deviation of the survey results, the experts analyzed the deviation of the score of project risk influencing factors. Through questionnaire, brainstorming and project seminar, the risk assessment form of this project is as follows:

Table 10 Results of risk value.

序号	First level risk index	Secondary level risk index (Risk factors)	Probability of Occurrence (L_i)	Degree of Impact (X_i)	Risk Value (R_i)
1	需求风险 A1 Demand Risk	A11 The requirements of the project are not clear and difficult to define	0.31	25 %	**0.0775**
		A12 Changes in system requirements	0.32	25 %	**0.0800**
		A13 The system requirement analysis is not comprehensive enough and there are some omissions	0.30	25 %	**0.0750**
		A14 There are differences between the project staff and the client on the requirements	0.31	25 %	**0.0775**
2	技术风险 A2 Technical Risk	A21 The equipment in the new field needs to be used in the project	0.32	25 %	**0.0800**
		A22 There are not many successful cases of new technology used in the project	0.30	25 %	**0.0750**
		A23 Using immature and unsafe Technology	0.27	25 %	**0.0675**
		A24 Program development method and system algorithm are defective	0.27	25 %	**0.0675**
3	组织风险 A3 Organization Risk	A31 The company's resources limit the project	0.29	25 %	**0.0725**
		A32 Lack of definition of project success criteria	0.28	25 %	**0.0700**
		A33 Lack of support from senior management	0.29	25 %	**0.0725**
		A34 The project manager is lack of experience and ability	0.24	25 %	**0.0600**
4	用户风险 A4 User Risk	A41 Users don't attach importance to project management	0.27	25 %	**0.0675**
		A42 Some of the user's personnel conflict with the project	0.27	25 %	**0.0675**
		A43 Lack of communication with information companies	0.28	25 %	**0.0700**
		A44 Users are not clear about the objectives and requirements of the project	0.30	25 %	**0.0750**
5	团队风险 A5 Team Risk	A51 Frequent flow of team members or operators	0.26	25 %	**0.0650**
		A52 Key personnel turnover	0.25	25 %	**0.0625**
		A53 Not familiar with their own tasks, inefficient team work	0.27	25 %	**0.0675**
		A54 It's hard to communicate within the team	0.29	25 %	**0.0725**

序号	First level risk index	Secondary level risk index (Risk factors)	Probability of Occurrence (L_i)	Degree of Impact (X_i)	Risk Value (R_i)
6	**控制风险 A6 Control Risk**	A61 Lack of historical data for reference	0.29	25 %	**0.0725**
		A62 Insufficient estimation of project progress	0.28	25 %	**0.0700**
		A63 Inadequate estimation of project resources	0.30	25 %	**0.0750**
		A64 Insufficient monitoring of project implementation process	0.28	25 %	**0.0700**

The weights of first level risk index were determined by expert seminar.
Source: (From calculation, **Tables 4 - 6**)
Source: The website of online questionnaire inquiry. (2021). Retrieved from https://wj.qq.com/s2/8306298/60cd

Conclusions

The result in **Tables 8 - 10** shows above;

Table 11 Risk value and risk matrix.

Factors	Risk value	Risk matrix
A1 Demand Risk	0.310	Slight - Low
A2 Technical Risk	0.290	Slight - Low
A3 Organization Risk	0.275	Slight - Low
A4 User Risk	0.280	Slight - Low
A5 Team Risk	0.268	Slight - Low
A6 Control Risk	0.288	Slight - Low
Average total value	**0.2852**	**Low risk**

Risk level: $\sum R_i = 0.2865 < 0.3$ Low risk

The implementation risk of the project is at a low risk level (the controllable range is in the safe area), and the risk of project implementation failure is small.

Table 12 Risk value (R_i) level table of software system project.

Probability / Harm	Very high (0.9)	High (0.7)	Medium (0.5)	Low (0.3)	Very Low (0.1)
Disaster (0.9)	**0.81**	**0.63**	**0.45**	**0.27**	**0.09**
Significant (0.7)	**0.63**	**0.49**	**0.35**	**0.21**	**0.07**
Medium (0.5)	**0.45**	**0.35**	**0.25**	**0.15**	**0.05**
Slight (0.3)	**0.27**	**0.21**	**0.15**	**0.09**	**0.03**
Very slight (0.1)	**0.09**	**0.07**	**0.05**	**0.03**	**0.01**
Risk level: $R_i = 0.2852 < 0.3$ Low risk					

Source: (From calculation, **Tables 8 - 10**)

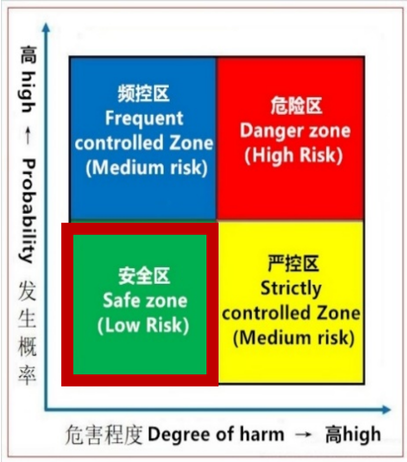

Figure 8 Risk value and corresponding risk matrix zone (red box area).

In the process of the construction of the digital food safety supervision cloud platform project, Delphi technology is used to collect risk data, and the research is carried out with reference to SEI model.

The conclusions are as follows;

1) The project risk of digital food safety supervision cloud platform has identified 24 risk factors of 6 categories.

2) Among the 6 types of risks analyzed by the digital food safety supervision cloud platform project, the project demand risk and team management risk have the greatest impact; The most important parts of the sub index are project progress risk and project decision-making risk, and these risk factors should be controlled and controlled.

3) The implementation of the project covers a wide range of people, and the implementation failure has a great impact. Through the joint efforts of the implementer and the client, the implementation is successfully completed, and the implementation risk is controlled in the low-risk range. The client is satisfied with the work of the implementer.

4) The method of risk factor identification and risk assessment is easy to operate and practical, and can be carried out continuously.

5) The operation method of project risk management mode based on CMM/CMMI system is simple, easy to realize and the implementation effect is good.

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