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A Checklist for Assessment of Risks Involved in IT Service Project Contract

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요 약

최근 한국의 대규모 IT 서비스 프로젝트의 수익률은 저하되고 있는 것으로 파악된다. IT 서비스 프로젝트의 수익률을 저하시키는 가장 큰 이유는 프로젝트와 관련된 여러 위험 요인들이 프로젝트의 일정 지연 및 비용 초과를 초래한 것으로 파악 된다. 이러한 일정 지연 및 비용 초과 현상을 방지하기 위해서는 프로젝트의 위험 요인들을 계약 체결 전에 식별하는 것이 매우 중요하다. 왜냐하면 발주사와 개발사간 계약 조건 협상 시 식별된 위험 요인들을 제거할 수 있기 때문이다. 본 연구에서는 IT 서비스 프로젝트의 특성으로 인해 프로젝트 수행 과정에서 발생할 수 있는 계약 위험 요인들을 사전에 파악하고 평가할 수 있는 체크리스트를 제시하고, 이를 실제 금융 산업의 IT 서비스 프로젝트에 적용하여 그 효과를 확인하고자 하였다. 적용 사례를 분석한 결과 IT 서비스 프로젝트의 위험 요인들을 식별하고 제거하는데 본 연구에서 제시된 체크리스트가 효과가 있음을 확인하였다.

☞ 주제어 : IT 서비스 프로젝트, 프로젝트 계약, 프로젝트 위험관리, 프로젝트 수익률

ABSTRACT

Risk factors are the reason behind cost overruns and delays in long-term large-scale IT service projects. Major risks originate from the integration of complex IT system components, including software, hardware, and solutions; the competitive bidding process; the turnkey and firm-fixed price nature of contracts; and the project execution environment. We have identified several risk factors such as delay in acceptance, low quality of deliverables, delay in payment, adding and changing requirements and scope, unclear definition of roles and responsibilities of the buyer and supplier, and unclear procedures of change and quality management during the project execution phase. One needs to manage risks proactively before signing the contract. In order to weed out or lower the risk factors well in advance, we need to identify and remove risk factors contained in contract clauses and attached contract documents. We propose a checklist for assessing IT service project contracts. To validate the checklist's utility, we applied it to an IT service project in the finance industry. The results show that the checklist is effective in identifying and removing risk factors pertaining to IT service projects.

☞ keyword : IT service project, project contract, project risk management, project profit

1. Introduction

A typical buyer in Korea usually sends a request for proposal (RFP) according to the set process for placing and accepting an order for IT service projects. Several suppliers submit competitive proposals, which are evaluated by the buyer before making a choice. The two parties then negotiate the contract terms and conditions, and discuss attached documents such as the statement of work (SOW) and other material lists. Finally, they sign the contract based on a firm-fixed price (FFP) and turnkey model. After signing the contract, the supplier submits the deliverables in accordance with the milestones involved in the software development life cycle (SDLC), such as analysis, design, development, testing, and opening. The buyer inspects the deliverables and makes the payment if the deliverables pass the criteria [1].

IT service projects entail the skills of system integration, including software, hardware, database management system (DBMS), and solutions; knowledge of applications and processes, and the related industry; and project management skills such as scope, time, cost, risk, and quality [2].

A customer's requirements could easily change during the project execution phase due to the software's invisibility. This

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may result in a delay in the inspection of deliverables and the project schedule, cost overruns, and finally, lower profits [2].

As stated earlier, buyer's contract proposals for IT service projects use FFP and turnkey model. This might induce various risk factors pertaining to the inspection criteria of deliverables, the payment schedule, and the conditions. To prevent schedule delays and cost overruns, it is necessary to review the clauses mentioned in contract documents; subject matter and scope; roles and responsibilities of the buyer and supplier in each project life cycle stage, contract period, and project milestone; payment schedule and criteria; inspection criteria of deliverables; liabilities and damages; assumption and prior conditions; and quality and change management processes.

We reviewed relevant literature such as studies on improvement in IT service project profitability [2,3,4,5], success and failure factors of IT system projects [6,7,8,9,10], and risk factors, conflicts, and considerations of design-build and turnkey model project contracts [11,12,13,14,15,16].

Although these literature deals with various success and risk factors regarding IT project contract, we focused more on at how to remove risk factors and prevent the potential conflicts between buyer and seller at negotiation phase before signing the contracts.

In this study, we propose such a checklist to enable the proactive assessment of the risk factors associated with IT service project contracts. We tested the effectiveness and significance of this checklist on an actual IT service project implemented in the finance industry.

Chapter 2 of this study discusses the background behind the study, while chapter 3 suggests a checklist for IT service project contracts. Chapter 4 discusses the application of the checklist to an actual finance industry project, and chapter 5 draws the conclusion, including the summary, limitations, and suggestions for further studies.

2. Background Knowledge

2.1 IT Service Projects

2.1.1 Concept of IT Service Projects

The IT industry comprises the IT service, software, and hardware industries. The IT service industry includes consulting, development, outsourcing, education, and training. The development area includes system integration (SI) and application development projects [Table1].

IT service involves projects to create new services that integrate IT professional technologies with industrial knowledge to upgrade an organization's competitiveness and improve the value of a business and its products using IT skills. Thus, IT service projects require IT professional technologies and industrial knowledge, and involve project management skills such as scope, schedule, cost, and risk [2].

〈Table 1〉 IT Industry 〔5〕

Industry	Area	Project or product
IT Service	Consulting	IT Consulting Business Consulting
	Development	System Integration, Application
	Outsourcing	IT, Business
	Education and Training	IT Support, IT Education and Training
S/W	Application, System	Middleware, ERP, DBMS
H/W	Server, PC, N/W	Mainframe Unix, Router

The average revenue of the top 30 IT service providers in Korea stood at USD657.4 million, and the average operational profit was about 6.9% at the end of 2012. Of these companies, five earned over USD1,000 million in revenue, with about a 9% operational profit. The operational profit of companies with revenue ranging from USD200~1,000 million was about 4%. Companies with revenue below USD200 million recorded an average operational profit of 2%, which is quite lower than that of companies with higher revenue [Table 2].

〈Table 2〉 Revenue and Profit Rate of Top 30 IT Service Companies in Korea 〔2012〕 〔4〕

Revenue (USD mil.)	No. of com.	Ave. revenue (USD mil.)	Ave. profits (%)	Ave. employees
1,000~	5	2,107	9	5,595
500~1,000	7	634	4.2	1,036
200~500	16	273	4.8	1,014
100~200	2	195	2.0	313
Ave.		657.4	6.9	1,735

Profit from IT service projects can be negatively impacted by various risk factors characterized by the project, team, and environment. These risk factors include the support level of the headquarter's departments, acceptance criteria and condition of deliverables, change procedure and criteria, fairness of contract conditions, support level of the buyer's executives and users, and rules and habitual practice originating from the environment [2].

2.1.2 Characteristics of IT Service Projects

A project is "a temporary endeavor undertaken to create a unique product, service, or result". A project has a unique purpose; is temporary and developed using progressive elaboration; requires resources, often from various areas; requires a primary customer or sponsor; and involves uncertainty [18]. IT service projects integrate hardware, networks, system software, package solutions, framework, DBMS, and application software. There are various risk factors originating from the technical complexity and rapid changes in IT technologies. As IT systems are developed using the SDLC stages of analysis, design, coding, testing, opening, and maintenance, there are risk factors originating from the invisibility, complexity, changeability, and intangibility of the software [10].

In Korea, buyers usually use the public competitive bidding process. The buyer sends the RFP, to which any certified suppliers can respond. The buyer then chooses the best proposal, and then the two parties negotiate and sign the contract using an FFP and turnkey model. Suppliers try to make their proposal better than that of competitors and consequently, win the order by offering a discounted price. Here, they face the risk of lack of costs necessary to complete the project [1]. Also, if the IT service project is contracted with an FFP and turnkey model, the supplier could face higher risks than the buyer [Figure 1].

(Figure 1) Contract Model and Risk〔19〕

Furthermore, the risk level can be increased if the buyer's requirements are not comprehensive. In order to proactively avoid or lower the various risks involved with IT service projects, one should review the risk factors associated with the contract and attached documents such as the SOW and material list, discuss and negotiate the contract terms and conditions in detail, and sign the contract only when it looks fair.

2.1.3 Risks Involved with IT Service Projects

The Standish Group Report indicates the top 10 failure and success factors for projects. The main failure factors are related with the user's requirements and the project's scope, such as incomplete requirements, lack of user involvement, unrealistic expectations, lack of executive support, and changing requirements and specifications [Table 3].

(Table 3) Project Failure and Success Factors〔6〕

Failure factors	%	Success factors	%
Incomplete requirements	13.1	User involvement	15.9
Lack of user involvement	12.4	Executive and management support	13.9
Lack of resources	10.6	Clear statement of requirements	13.0
Unrealistic expectations	9.9	Proper project planning	9.6
Lack of executive support	9.3	Realistic expectations	8.2
Changing requirements/ specifications	8.7	Smaller project milestones	7.7
Lack of project plan	8.1	Competent staff	7.2
No longer relevant	7.5	Ownership	5.3
Lack of IT technologies	6.2	Clear vision and objectives	2.9
Technological illiteracy	4.3	Hardworking, focused staff	2.4

Risk factors can be categorized by phases in the project life cycle such as the sales, planning, executing, and closing phases. At the sales phase, we identified risk factors such as

incomplete requirements and scope, an FFP contract model, and inaccurate price estimation. At the planning phase, we identified risk factors such as lack of user involvement and delay in defining requirement and scope baselines. At the executing phase, we identified risk factors such as addition and change in requirements, lack of requirement tracing and user involvement, and low productivity of supplier's project members. At the closing phase, we identified risk factors such as inappropriate and unclear approval criteria, delay in user acceptance test, as well as delay in product and final deliverables [Table 4].

(Table 4) Risk Factors by Project Life Cycle [9]

Life cycle	Major risk factors	
	Buyer	Supplier
Sales phase	Incomplete requirements of FFP contract	Incomplete scope, inaccurate price estimation
Planning phase	Lack of user involvement, incomplete requirements	Delay of scope baseline, delay in definition of requirements
Executing phase	Addition/change in requirements, lack of user involvement	Low productivity, lack of requirement tracing
Closing phase	Inappropriate and unclear approval criteria	Delay in user acceptance test, delay in product and final deliverables

The risk level is highest at the initiating and planning phases owing to the uncertainty of information, a characteristic of progressive elaboration [18]. To weed out or lower the risks involved with IT service project contracts, one should review the risk factors before signing the contract. The sales phase includes the pre-proposal, proposal, bidding, negotiating, and contract stages. At the pre-proposal stage, risk factors pertaining to business structure, buyer's credits, and legal issues are reviewed. At the proposal stage, the risk factors of cost and margin, and the risk of proposal contents such as possibilities of technical realization and resources are reviewed. At the bidding stage, the risk factors of price, buyer's credits, legal issues, and fair trade are reviewed. At the negotiating stage, the risk factors of scope and price, contract conditions,

and roles and responsibilities of both parties are discussed, adjusted, and agreed upon. At the contract stage, the risk factors of cost and margin, contract terms and conditions, and project execution are reviewed [Table 5].

(Table 5) Risk Factors in Sales Phase [9]

Phase	Items of risk reviewed
Pre-proposal	Business structure, buyer's credits, legal issues
Proposal evaluation	Cost and margin, risk of contents
Bidding	Price, credits, legal issues, fair trade
Negotiating	Scope, price, contract conditions, roles and responsibilities
Contract	Cost and margin, contract conditions, project execution

2.2 IT Service Project Contracts

2.2.1 Concept of Contract

A contract is an agreement of expression of intent of two sides to generate the obligatory rights and obligations[17]. Under the civil law of Korea, contracts are categorized as turnkey or FFP type for IT service projects, buy and sell type for hardware and software licenses, lease type for offices, and amicable settlement type for termination of IT service projects [17]. Contract type can be categorized as firm fixed price (FFP), fixed price incentive (FPI), cost plus award fee (CPAF), cost plus incentive fee (CPIF), cost plus fixed fee (CPFF), and cost plus percentage of cost (CPPC) [19]. Under a turnkey or FFP contract, the supplier delivers the completed contract deliverables within the contract period. The buyer then inspects the deliverables and pays the bill. The supplier might face higher risks than the buyer because the price is fixed at the time of signing the contract, but requirements and scope can expand and change during the project execution phase.

2.2.2 Clauses of IT Service Project Contracts

A typical contract consists of the front, main body, and end parts [Table 6]. The front part includes the title, preamble, purpose, and definition clauses. The main part has the subject

matter, contract price, and assurance clauses. The subject matter clause has detailed clauses for scope, period, delivery schedule and method and place, inspection criteria, and procedure. The contract price clause has detailed clauses pertaining to price, payment schedule and criteria and method, and payment delay. The assurance clause contains detailed clauses for insurance, defect, force majeure, confidentiality, and intellectual property rights (IPR).

(Table 6) Clauses of Contract [17]

Part	Clause	Detailed clause
Front	Title, preamble, purpose, definition	
Main body	Subject matter	Scope, period, delivery schedule/method/place, inspection
	Contract price	Price, payment schedule/criteria/method, payment delay
	Assurance	Insurance, defect, force majeure, confidential, IPR
End	Termination	Conditions/settlement
	Change	Change procedure
	Resolution	Competent court
	Agents	Agents/signature

Law of Korea government suggests the standard contract terms and conditions for fair trade for general service projects between the supplier and government organization [Table 7].

(Table 7) Clauses for General Service Contract [21]

Part	Clause	Detailed clause (C)
Front		General (1C), definition (2C), applicants (3C), language (5C), notification (6C)
Main body	Subject matter	Documents (4C), supplier's employees (11C), supervision (12C), initiation reporting (13C), holiday and overtime work (14C), change of scope (16C), arrears (18C), postponement of period (19C), inspection (20C), acceptance (21C), acceptance of completion (22C), submission of related documentation (37C)
	Price	Price adjustment from ascension (15C), price adjustment from other

Part	Clause	Detailed clause (C)
		change (17C), payment of completed deliverable (26C), payment (27C), interest on payment delay (28C)
	Assure	Assignment of right (7C), performance bond (8C), handling of performance bond (9C), performance bond of service contract (10C), general damages (23C), use of patent rights (25C), confidentiality obligation (35C), bid limit of injustice (34C)
End	Termination	Contract termination/cancellation (29C,30C,31C), temporary holding (32C,32C-2)
	Force majeure (24C)	
	Resolution of dispute (36C)	

3. Checklist for IT Service Project Contracts

IT service projects are usually based on FFP and turnkey model contracts. As these contract types could pose higher risks than other models, the supplier should review and discuss various risk factors such as requirements and scope, contract price, payment schedule and conditions, roles and responsibilities, contract changes, inspection and delay of deliverables, protect of confidential business and technical documents, termination and cancellation, and warranty.

To avoid or lower the risk factors of IT service project contracts, we have proposed a checklist [Table 8]. We derived the review items using the government's contract [21], the ICC model for turnkey contracts [11], and other related contracts. Also, we considered risk factors related characteristics such as software, bidding, contract model and type, and project execution environment.

(Table 8) Checklist for IT Service Project Contract

Review item	Explanation of item	Risk factor
Baseline of contract, priorities	Baseline of contract documents, priorities of contract documents	S/W, invisible
Entire agreement	This agreement substitutes the previous agreement.	Bidding, Competitive

Review item	Explanation of item	Risk factor
Contract period	From to period	Project, temporary
Contract price	Total, service, material	Contract, FFP
Payment schedule	Payment schedule, frequency, percentage, criteria, method	Contract, FFP
Performance bond	Rate of performance rate for contract price, liabilities for damages	Contract, FFP
Baseline of scope	Baseline documents for scope	S/W, Change and add
Scope change	Scope change process and criteria	S/W, Change and add
PM	Project manager's authorities and roles	Project, HR management issues
Human resource management	Working hours, holiday, training and education	Project, HR management issues
User involvement	User involvement for definition of requirement and inspection	S/W, intangible
Inspection	Inspection process and method, separation of service and material	S/W, invisible
Arrears	Rate of arrears per day, limit of arrears	Contract, turnkey
IPR	Possessive, use, rewritable right	S/W, copy able
Damages	Liabilities for damages	Contract, turnkey
Termination	Termination/cancellation, settlement	Contract, turnkey
Warranty	Warranty bond rate, obligation, period	S/W, complex
Dispute	Competent court, arbitration	Contract, turnkey

We prepared review criteria for contract [Table 9] for each review item using the government's contract terms and conditions [21] and other related contract conditions [11,12,16] to ensure a fair trade between the buyer and supplier for IT service projects.

(Table 9) Review Criteria for Contract

Review item	Review criteria	Refer.
Baseline of contract, priorities	Clear baseline of contract documents, SOW is higher priority than RFP and proposal	Table 7 (4C)
Entire agreement	Confirm this agreement substitutes any previous agreements	Table 8
Contract period	Clear start to end dates of contract period	Table 8
Contract price	Confirm contract price, separate service and material prices	Table 7 (26C~ 27C)
Payment schedule	Payment schedule and percentage are related to project milestones.	Table 7 (26C~ 27C)
Performance bond	Under 10% of contract price	Table 7 (8C)
Baseline of scope	SOW is the baseline document for scope	Table 7 (4C)
Scope change	Scope changes should be written; change by CCB process and criteria	Table 7 (16C)
PM	Define PM's R&R	PMBOK
Human resources	Define working hours, holidays, education	Labor law
User involvement	Define user's roles and responsibilities	PMBOK
Inspection	Define inspection process and method, separate service and materials, inspection period within 7 to 14 working days	Table 7 (20C, 26C)
Arrears	Arrears rates are 0.15% for materials, 0.25% for service per day; arrears limit is within 20% of contract price	Table 7 (18C)
IPR	Mutually possess right or use and rewrite right for suppliers	Table 7 (25C)
Damages	Define limit of damages with contract price	Table 7 (23C)
Termination	Define reasons and cases for termination or cancellation	Table 7 (29C~ 31C)
Warranty	Define period, scope of warranty; warranty bond rate is within 10% of contract price	Table 8
Dispute	Usually Seoul courts	Table 7 (36C)

4. Application of Checklist for IT Service Project Contracts

4.1 Application of Checklist for IT Service Project Contracts

We have proposed a negotiating and contracting procedure for IT service projects when a buyer's contract template is used. For IT service projects, the supplier gets the buyer's contract templates and identifies the risk factors associated with contract terms and conditions. Both parties discuss and adjust their positions and reach the final agreement of the contract. They report the final negotiation results of the contract conditions. If the final decision maker approves the negotiation results, they can sign the contract. If the final decision maker does not approve, they negotiate the contract conditions again [Figure 2]. To prevent the additional negotiation, the negotiator assesses the negotiable range for critical contract conditions well in advance.

The contract negotiation table shows the buyer's and supplier's positions, discussion and adjustment, and final agreement on each contract term and condition.
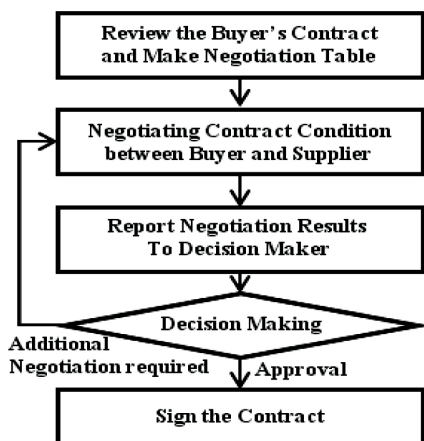
(Figure 2) Negotiation and Contract Procedure [9]

The terms and conditions show the selected contract clauses, including the risks resulting from reviewing the buyer's contract using the checklist. The buyer's position shows the contract terms and conditions, including risks identified using the checklist's review criteria. The supplier's position shows the revised contents of the contract using the checklist's review criteria to avoid or lower the risks of the buyer's contract. The discussion and adjustment show the contents of the discussions and adjustments during the contract negotiation stage. The final agreement shows the contents of the agreement between the buyer and supplier achieved through contract negotiation [Table 10].

(Table 10) Contract Negotiation Table [9]

T&C	Buyer's Position	Supplier's Position	Discuss and adjust	Final Agree.

4.2 Application Results of Checklist for IT Service Project Contracts

We applied the checklist for IT service project contracts entitled "A Securities Investment System Development." The project was initiated to improve and upgrade the old legacy system. This new system includes an application development subsystem, and IT infrastructure subsystem, and other general support and education subsystems. The application development subsystem includes the account transaction and information analysis parts. The project includes detail design, coding, testing, and transition milestones. Analysis and basic design were executed through previous project with another company.

The final contract negotiation result table shows the terms and conditions, buyer's position, and final agreement [Table 11]. The terms and conditions show the selected clauses that have risk factors associated with assessment and identification using the checklist for IT service project contracts. The buyer's position column sows the original contents of buyer's contract proposal. The final agreement shows the final results of the agreement after discussing and adjusting each term and condition. When there were some user requirement and design changes during integration test phase the contract became a guideline to resolve the conflicts between buyer and supplier without going to court. We confirmed that this checklist helped to make contract fair and to prevent the any conflicts between them. We developed a standard checklist for contract and applied to other projects in company.

(Table 11) Final Contract Negotiation Results [9]

Terms & Conditions	Buyer's position	Final agreement
Contract baseline, priorities	SOW, RFP, proposal have equal priorities	SOW is the baseline of contract documents, RFP and proposals are the references for disputes
Entire agreement	N/A	This contract substitutes any previous agreements including RFP and proposals.
Payment schedule	N/A	Five time payments based on milestones (contract, design, development, integration testing, final inspection)
Baseline of scope	SOW, RFP, proposal	SOW, project management plan
User involve & Support of buyer	N/A	Define user requirements on time; supply the required documents, space, network facilities
Inspect	N/A	Inspect within 7 days, detail inspection process on project management plan
Arrears	Rate: 0.3% per day, limit: zero	Rate: 0.25% per day limit: 20% of contract price
IPR	Buyer has possession right of IP	Buyer holds possession right after paying the designated bills; supplier has the right to use and rewrite software
Damages	No limit	Limit: contract price
Terminate	Buyer can terminate contract freely and holds the IPR.	The contract should terminate upon agreement; the IPR can be transferred when the bill is paid

5. Conclusion

Normally, large-scale IT service projects bring in lower profits due to several risk factors originating from system integration (including software and hardware), the competitive bidding process, FFP and turnkey models, and the project environment. To weed out or lower the risk factors during the contract negotiation phase before signing the contract, one should review and identify the risk factors included in contract clauses, such as subject matter, definition of scope, inspection criteria, damages, and termination using the proposed checklist.

The checklist was applied to an actual IT service project in the finance industry in order to verify its significance and effectiveness.

The contract terms and conditions of IT service projects supply the guidelines for the project life cycle, and define the rights and obligations between the buyer and supplier. If any claims or disputes occur, the contract terms and conditions become the guidelines for decision making of which part have responsibilities. Thus, our suggested checklist for IT service project contracts can be utilized by the IT services industry to remove or lower the risk factors that may impact profits.

Besides assessing, identifying, and removing the risk factors in IT service project contracts, the checklist can play a vital role in securing the approval of final decision makers and contribute toward making the contract fair and balanced between the buyer and supplier. However, the checklist needs further verification as it has been applied only to the IT service industry with FFP and turnkey model contracts. It needs to be applied to other industries and contract models. We have proposed a checklist for IT service project contracts with FFP and turnkey models used in the domestic industry. However, we expect further studies to cover other industries and contract models beyond the domestic space.

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