

# Case Study on the Lean Six Sigma Management for Information Technology Service Management Project of G Commercial Bank\*

Yongmei Xu<sup>1</sup>, Fan Zhang<sup>2,3</sup>, Xiaowen Ye<sup>4</sup>

<sup>1</sup>Department of Business Administration, School of Management, Jinan University, Guangzhou, China

<sup>2</sup>School of Business Administration, South China University of Technology, Guangzhou, China

<sup>3</sup>The Party School of the CPC Guangdong Provincial Committee, Guangzhou, China

<sup>4</sup>School of Management, Jinan University, Guangzhou, China

Email: txuym@126.com, shermon@163.com

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## ABSTRACT

Based on the literature review which concludes the Lean Six Sigma management theory, Information Technology Infrastructure Library (ITIL) and the key success factors of Information Technology service management (ITSM), this paper analyzes the present situation of information system in G bank and also the challenge it is facing. Furthermore, this paper puts forward a process optimization scheme for the production changes of G bank's ITSM with the Lean Six Sigma management theory. What's more, the paper dissects the production changes of G bank's ITSM by means of DMAIC method in order to achieve these four goals: Firstly, optimizing the process and improving the internal work efficiency also. Secondly, reducing the variation and the error rate and also improving the system availability. Thirdly, strengthen the business interaction in order that the IT value could be reflected preferably. The last but not least, cutting the overtime is to improve employee satisfaction. But improving the ITSM of the banking industry is our ultimate aim.

**Keywords:** Information Systems; Information Technology Infrastructure Library; Information Technology Service Management; Six Sigma; Critical Success Factors; Commercial Bank

## 1. Introduction

Information Technology service management (ITSM) based on Information Technology Infrastructure Library (ITIL), which integrates the best practices of global IT management and forms the normative truth standard to reduce effectively cost and improve the quality of service, is applied widely in the world [1]. The whole framework of ITIL is illustrated in **Figure 1**. ITIL, which was developed by the Central Computer and Telecommunications Agency (CCTA, merged with the OGC) of the UK government in the middle of 1980s, is a set of service management standard library which focuses on IT industry. In the past 20 years, the content of ITIL has been updated and renewed. Today the OGC has enacted the

ITIL 3.0.

This paper is organized in the following: Section 2 is a literature review, including Six Sigma Process Improvement, ITSM and their critical success factors (CSF). Section 3 is the introduction information systems of G Commercial Bank. Section 4 is ITSM project preparation of G Commercial Bank. Section 5 is ITSM project implementation of G Commercial Bank ITSM project. Finally, Section 6 is conclusion.

## 2. Literature Review

### 2.1. The Improvement of Six Sigma Process

The Six Sigma process improvement initiative originated in 1986 from Motorola's drive toward reducing defects by minimizing variation in processes, which in turn required explicit measurement of solid metrics [2]. Applications of the Six Sigma project execution methodology have since expanded to include more explorative objectives, such as increasing customer satisfaction, or devel-

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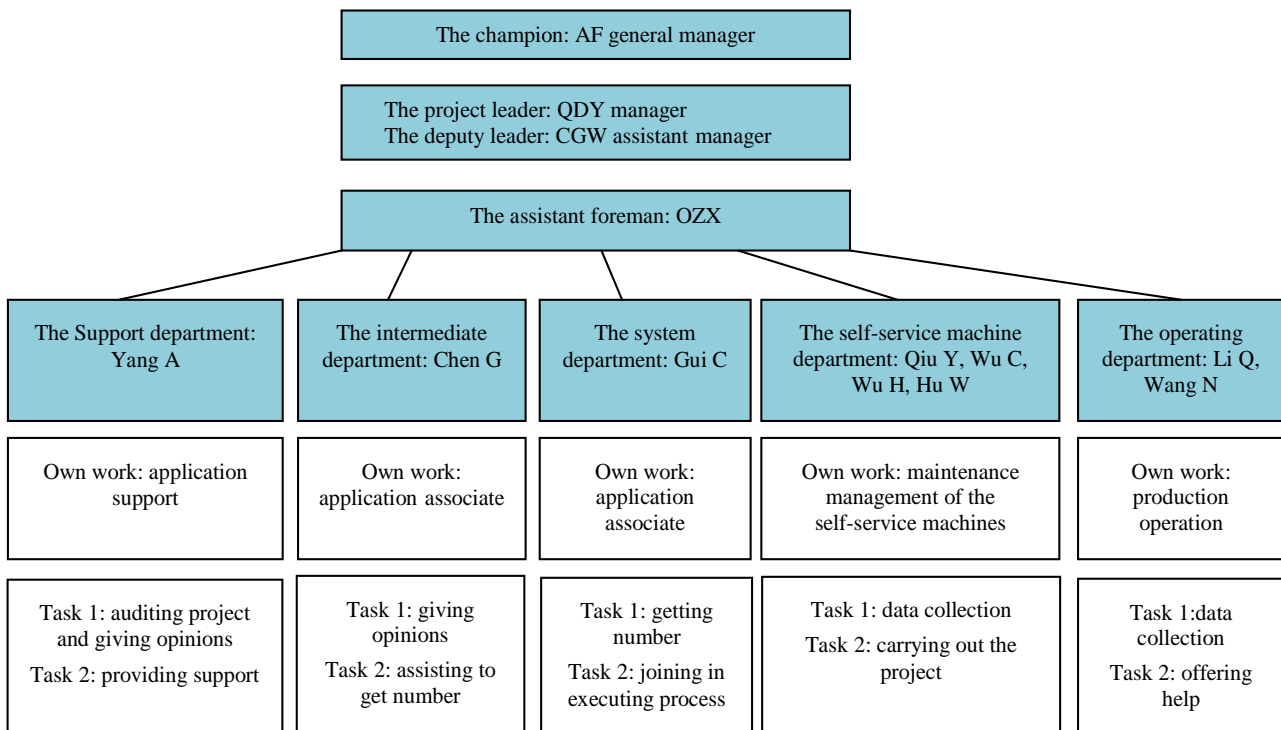


Figure 1. G bank’s organization chart of Lean Six Sigma.

oping closer supplier relationships, and the use of softer practices, such as brainstorming and “five-why” analyses to capture tacit knowledge of project team members [3]. The question that remains unanswered is whether the use of tacit-knowledge-capturing practices provides a higher degree of project success.

**2.2. The Critical Success Factors of ITSM**

The critical success factors (CSF) approach was first established in the 1960s and popularized by various researchers, including Rockart and Bullen [4] who provided an operational definition of CSF: “key areas where things must go right in order to successfully achieve objectives and goals”. It has been pointed out by Williams and Ramaprasad [5] that although the CSF approach is widely used by researchers to produce a plethora of factors, it is important to discriminate between different levels of criticality.

They distinguish four types of criticality: 1) Factors linked to success by a known causal mechanism, 2) Factors necessary and sufficient for success, 3) Factors necessary for success, and 4) factors associated with success. This research offers guidelines to practitioners by focusing on the fourth level. We identify a set of CSFs associated with successful ITSM implementation.

The study of Wui-Gee Tan, Aileen Cater-Steel and Mark Toleman indicates that the commitment of senior management is crucial to the project’s success as is a

project champion and the recognition of the need for an appropriate alteration management strategy to transform the organizational culture to a service-oriented focus. Maintaining close and forthright relationships with multiple vendors facilitates technology transfer to in-house staff while a benefits realization plan is a valuable tool for tracking and communicating tangible and intangible project benefits to the project stakeholders. An effective project governance and execution process further contributes to the implementation success [6-9].

**3. The Development and Present Situation of G Bank’s Information System**

G bank now has 215 IT staffs and more than 500 sets equipment in the center machine room. From year 2006 to 2010, the year volume of G bank has risen from 2.2 million to 50 million, besides, its IT system which is supporting to business development grew rapidly and the relation between the application systems is complex. And these can be reflected by the following, the capacity of the storage system from 10 TB increase to 150 TB, the application and platform related to the integrated front-banking system which is bearing the bank’s core business like ATM has dozens of equipment or system, such as gateway, gold card, encryption server, Network control device, self-service terminal platform, Comprehensive monitoring platform, network, storage, Universal file transfer, Batch automation, Backup, user manage-

ment, etc.

G bank has build up an information system platform which is about all the customers in the bank, and also a marketing management system for personal and the customers of the public. A number of applications have been launched like the unified management for financial production of home and foreign currency, the personal financial service level has also been improved effectively. Furthermore, in G bank, the FOVA system development has completed successfully, which was put into production in Macau branch, Seng Heng bank, Seoul branch and Singapore branch one after another, that made a solid first step for the overseas business system promotion, and it was networked with the global institutions in 2009. There was a breakthrough on the construction of risk management information system in G bank, the function of the corporate client credit management system (CM 2002) has been perfected further, while the personal customer credit management system (PCM2003) has been promoted all over the bank, and many application systems will be launched such as the interest rate management, internal ratings based approaches, business operation risk management and market risk management.

## **4. The Preparation of ITSM Project in G Bank**

### **4.1. The Organization Chart of Lean Six Sigma**

G bank has chosen some key staffs from 5 departments including support, intermediate, system, self-help and operation section as a kaizen team, and it was strict with the control of project team members (**Figure 1**), that avoided the following situations successfully: the wrong person is assigned to Lean Six Sigma project; The black belt and green belt almost have no time to do the project; It's short of the support from finance, IT, HR, equipment maintenance and other business departments; The project team is so big, whose involving departments is too much, that its team meeting and communication are not enough.

### **4.2. The Educational Training about Lean Six Sigma**

The propulsion of G bank ITSM project has the following two characteristics: first, it has alterationd the tradition that the survey and scheme were made by the intermediary organ. There is a project team that is formed by the key staffs from the province branch or secondary branch professional department and the workers at the production line, while the consulting company is mainly responsible for providing technical support method; Second, in order to get the supporting data ,the staffs work at a selected spot for a while. The staffs have been arranged in the pilots including the province branch,

Qingyuan branch and Foshan branch to record round-the-clock working content and duration (accurate to seconds) of the main post personnel, so that it can obtain statistical about the effective input time. Besides, G bank has held some field trainings, project meetings, interviews and questionnaires (the quantity was more than 300), that can ensure the reliability of the data. Finally, they have screened the main influence factors and targeted to improvement by means of the analysis of the data and summary of the present situation about the scientific and technological work.

### **4.3. The Project Selection of ITSM about Lean Six Sigma Management**

According to the situation of IT management in G bank, the most urgent problem to solve is that the production here is frequent occurrence, besides, based on the statistical data, it can be found that about 70% production events are owing to the manufacturing alteration. Therefore, following project objectives should be determined: the first one is optimizing the process and improving the internal work efficiency also. The second is reducing the variation and the error rate and also improving the system availability. The third is to strengthen the business interaction and have the IT value been reflected preferably. The last but not least, cutting the overtime time can enhance employee satisfaction.

## **5. The Project Implementation of ITSM in G Bank**

### **5.1. The Definition Phase (D)**

In January 2011, there were 199 alterations in total in G bank, and 28 alterations of those were in a lack of standardization. In the next month the amount of alterations was 127, while 30 alterations lacked of standardization. The rates of non-standard were 14.07% and 23.62%, which were in high level (**Table 1**).

After the evaluation, G bank has set a goal that the rates of non-standard should be dropped to 8% or blew, and this goal has obtained the approval of the department general manager club (**Table 2**).

### **5.2. The Measure Phase (M)**

The project team has measured the alterations of G bank, including three key stages: before the implementation, in the implementation and after the implementation. The stage before the implementation: it included early warning of alteration plan, implementation project establishment, risk control evaluation, SD (Service Desk, G bank IT internal helpdesk system), submitting alteration list. The stage in the implementation: It referred to implementation requirements, risk response, emergency treat-

**Table 1. The alterations' content distribution in January and February 2011.**

Department	January 2011					February 2011				
	Technology	Services	Total	The number of non-standard	Rate	Technology	Services	Total	The number of non-standard	Rate
Support promotion	58	0	58	13	22.41%	36	0	36	9	25.00%
Intermediate business	26	23	49	5	10.20%	15	10	25	2	8.00%
System management	30	0	30	6	20.00%	30	0	30	11	36.67%
Network management	24	0	24	0	0.00%	12	0	12	4	33.33%
e-bank	8	7	15	1	6.67%	4	4	8	2	25.00%
Operation	2	0	2	0	0.00%	0	0	0	0	
Information development	13	2	15	0	0.00%	11	2	13	0	0.00%
Equipment control	5	0	5	1	20.00%	2	0	2	1	50.00%
General management	0	0	0	0		1	0	1	1	100.00%
Safety production	1	0	1	0	0.00%	0	0	0	0	
Total	167	32	199	28	14.07%	111	16	127	30	23.62%

**Table 2. The definition table of project.**

Project's name	The improving project of ITSM production alteration in G bank			The signature of the champion
Project's champion	AF, HY	Project leader	QDY, (vice-) CGW	The project cycle
Project members	OZX, Yang A, Chen G, Gui C, Qiu Y, Wu C, Wu H, Hu W, Li Q, Wang N			
The problem description				
The customers' requirements: The bank can provide fast, efficient service and ensure their capital safety;				
The staffs' requirements: The working strength can be reduced;				
The bank management's requirements: Under the controllable risks, the system availability can be improved and the human resource can be saved;				
The present situation: The production alteration needs a long life cycle for examination and approval, and the reject ratio of alteration process is quite high, the production event here is frequent occurrence. These problems indirectly lead to the staffs' labor intensity is so big that it's hard to have save production; otherwise, the technicians here are lacking, etc.				
The success metric (the description of the index and the goal for project)			The scope of project	
Project index	Present situation	Goal	Challenging goal	Pilot unit: the system management, science and technology information department of branch
Examination and approval flow time	50 min	30 min	25 min	Selection reasons: it's representative because the system here is with great variety and big production alteration quantity; it has many associated departments, it can make the department to get comprehensive improvement including the core system availability and customers' evaluation after the success of the project; Besides, the leadership attaches great importance to the system management foundation work, it's convenient to communicate with superior management department, so it's chosen as the pilot unit. The project will involve the whole process of production management system alteration.
Reject ratio	15%	10%	8%	
Income and significance of the project			The planning and milestone of the project	
First one is building up a production alteration operation specifications of background information system which is highly efficient, high quality and with controllable risks, and improving customer satisfaction; second one is improving the information system availability ratio and reducing staff labor intensity, and to improve the staff's working enthusiasm; third is saving human resources; the last one is that Stable efficient operation of information system can help auxiliary to improve marketing efficiency, to realize the deposit, loan, intermediate business income growth.			1. Definition phase: 1 week	
			2. Measure phase: 2 weeks	
			3. Analysis phase: 1 week	
			4. Improve phase: 2 weeks	
			5. Local promotion: 4 weeks	

ment. The stage after the implementation: It contained results Verification, feedback of alteration list, required data update and filing (Table 3).

**5.3. The Analysis Phase (A)**

According to the alteration process evaluation above, and after the comprehensive analysis of the project team’s “brain storm”, each process improvement direction of alteration should be determined (Table 4).

**5.4. The Improve Phase (A)**

G bank has taken the optimization measures for the management before alteration, during the alteration and after it.

**5.4.1. The Optimization about the Management before Alteration**

The detail measures is that making the alteration’s collection schedule (including elements interpretation and case template), the templates and cases for the plan, the detailed explanation of SD system elements, and organizing trainings which cover the whole science and technology department (Figure 2).

**5.4.2. The Optimization about the Management during Alteration**

The control of the alteration implementation must be strengthened, and the following requirements should be carried out strictly: one principle (in emergency cases, the external services of the system should be recovered in

**Table 3. The value judgment evaluation about production process’ treatment scheme in G bank IT department.**

Alteration implementation process	Input	Action	Content	Value judgment
Fill in the alteration warning table	Implementation department manager	Input elements	Fill in the alteration briefly elements to pass the early warning evaluation	Necessary cost
Fill in alteration application form in SD system	The key staffs of Technology management	Make a plan and input the form	Make a implementation plan which covers in before to after the implementation, and input to the alteration management systems, coding scheme and input the form	Necessary cost
Fill in alteration application form in SD system	The sample form of alteration	Compare with the sample	Ensure that the alteration elements are correct by comparing with the sample	Unnecessary cost
Audit the alteration application form and material	Implementation department manager	Audit the alteration form	Audit the elements of the alteration form and the scheme of alteration	Necessary cost
Audit the alteration application form and material	Production management	Audit the alteration form	Audit the elements about production management of the alteration form	Necessary cost
Audit the alteration application form and material	Safety management	Audit the alteration form	Audit the elements about safety management of the alteration form	Necessary cost
Audit the alteration application form and material	Operations management	Audit the alteration form	Audit the elements about operations management of the alteration form	Necessary cost
Audit the alteration application form and material	Assist in implementing	Audit the alteration form	The technical personnel of B post audit the alteration scheme and the elements	Necessary cost
The implementation of alteration	Technical personnel of alteration’s implementation	Implement the alteration	Implement the alteration according to the alteration scheme	Increment
The double check of alteration	Assistant of implementing	Double check the alteration’s steps	Chose the key point review, back to back to review, review item by item based on the characteristics of different alterations	Necessary cost
The validation of alteration	Staff of validation	Verify the results	Verify the system after alteration according to the authentication scheme	Necessary cost
The feedback of alteration	Technical personnel of alteration’s implementation	Give feedback in SD	Complete the feedback in the second working days and the fill in the result of alteration’s implementation	Necessary cost
The close of alteration	Production management	Close the alteration in SD	Close the alteration after the feedback	Necessary cost

**Table 4. The improvement direction of alteration process.**

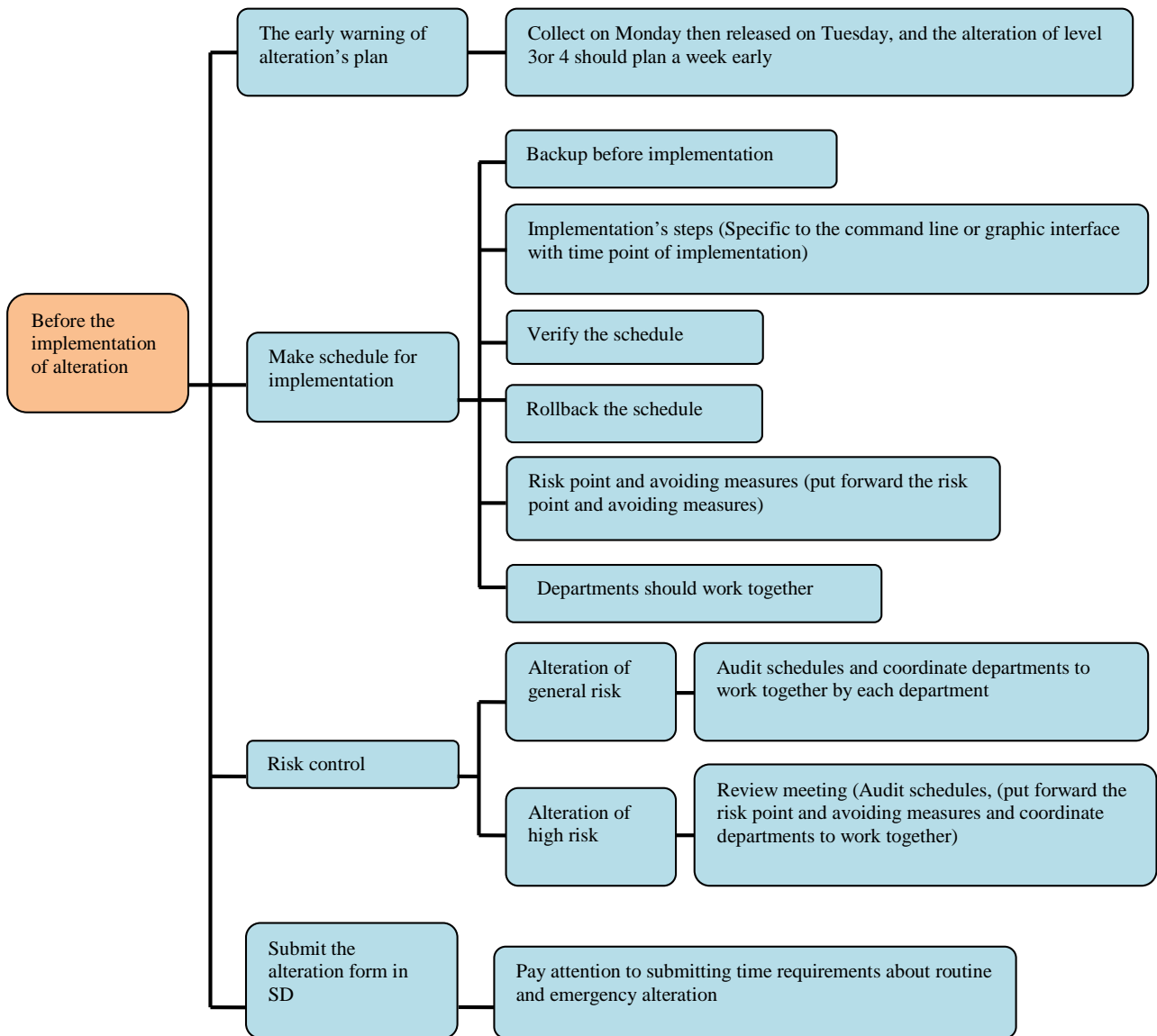
Process	Input	Present control situation	Improvement direction	Person in charge
Fill in the alteration warning table	Implementation department manager	The department manager fill in by himself frequently	Production Controller's guidance	OZX
Fill in alteration application form in SD system	The key staffs of Technology management	The key staffs of Technology management is responsible for the whole information system management architecture planning and problem solving, it's too busy for them to follow up in time	Make them guide the technical personnel to fill in the form in the idle time	Gui C
Fill in alteration application form in SD system	The sample form of alteration	The sample form involves case are not comprehensive and some instructions are not clear	Improve the sample form of alteration	OZX
Audit the alteration application form and material	Implementation department manager	Some managers are not clear to the items which need to be audited, so that some of the items will lack of auditing	Standardizing operations, and strengthen the training	OZX
Audit the alteration application form and material	Production management	Some staffs are not clear to the items which need to be audited, so that some of the items will lack of auditing	Standardizing operations, and strengthen the training	OZX
Audit the alteration application form and material	Safety management	Some elements are audited repeatedly, which wastes most of time. And some of the main points of examination and approval can't be caught so that it's easy to make mistakes	Standardizing operations, and strengthen the training	Gui C
Audit the alteration application form and material	Operations management	Some operators are not clear to the items which need to be audited, so that some of the items will lack of auditing	Standardizing operations, and strengthen the training	Gui C
Audit the alteration application form and material	Assist in implementing	Some technician are not clear to the items which need to be audited, so that some of the items will lack of auditing	Standardizing operations, and strengthen the training	Gui C
The implementation of alteration	Technical personnel of alteration's implementation	It is easy to make mistakes because of the long implementation time	Optimize personnel arrangement, refining the alteration's classification management measures	Gui C
The double check of alteration	Assistant of implementing	It's not based on the characteristics of different alterations when chose the auditing methods, that cause the waste	Build up hierarchical mechanism and ensure the auditing methods of different types' alteration	Gui C
The validation of alteration	Staff of validation	The dynamics and category of validation are not determined, which brings omissions.	Ensure the dynamics and category of validation	OZX
The feedback of alteration	Technical personnel of alteration's implementation	The specific condition of alteration is not asked for explicitly	Perfect the system function to remind feedback automatically	Gui C
The close of alteration	Production management	The alteration can close only after the technical personnel close it	Perfect the system function to remind close automatically	OZX

the first time), 4 prohibitions (operation without examination and approval, single operation, the operation during the examination and approval time or with unknown consequences are all banned), 5 musts (the operation must do in the machine room, must be two-man operation, must do according to schedule, and the schedule which has changed must have another approval, the abnormal situation must be reported in time), thus it can put an end to the production fault event caused by the inap-

propriate implementations (**Figure 3**).

#### 5.4.3. The Optimization about the Management after Alteration

Only pass the verification in test environment that the implementation schedule and execution script of production alteration can implement in the production environment in order to reduce the uncertainty of the operation risk (**Figure 4**).



**Figure 2. The optimization about the management before alteration.**

G bank needs to improve the management process of implementation: 1) The control of the alteration implementation must be strengthened, and the following requirements should be carried out strictly: one principle, 4 prohibitions and 5 musts in order to put an end to the production fault event caused by the inappropriate implementations; 2) Only pass the verification in test environment that the implementation schedule and execution script of production alteration can implement in the production environment in order to reduce the uncertainty of the operation risk; 3) The risk control before the implementation should be strengthened and for the implementation schedule with high risk, something must be done, such as auditing schedules strictly, ensuring the risk point and avoiding measures and coordinating departments to

work together; 4) The implementation steps should be extended to the command line or graphic interface, the time point of implementation should be marked out, and also the key procedures should be noted that which is the target server, so that it can achieve implementing clearly and operating with understood; 5) For the implementation with undetermined risk or high risk, the predetermined precept should be prepared, so that it can cope with implementation plan is anomalous; 6) Each department should fully consider the reasonable arrangement of alteration personnel to avoid the risk caused by working in fatigue like that the single one implements in a long time or into the late night; 7) After the improving the process, in G bank, the average examination and approval time of alteration is from 50 minutes down to 28

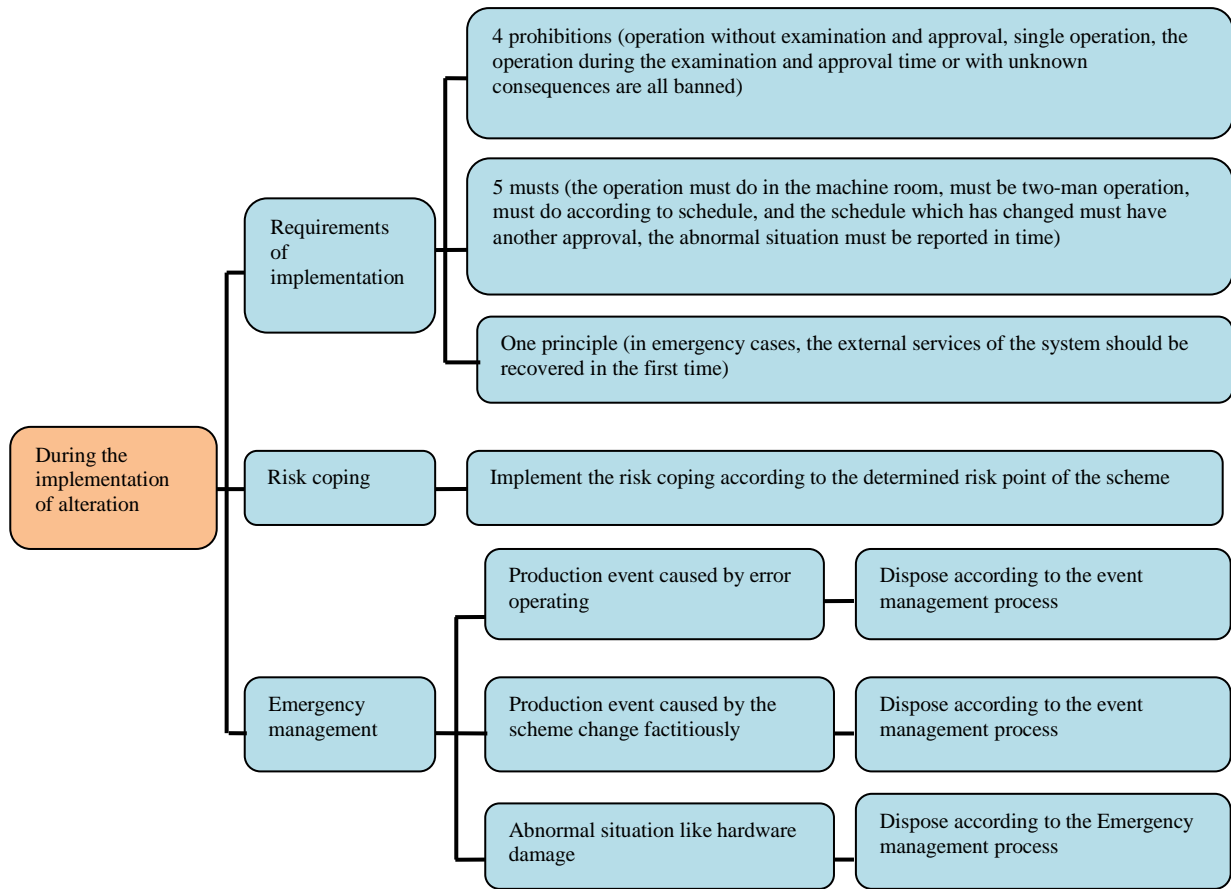


Figure 3. The optimization about the management during alteration.

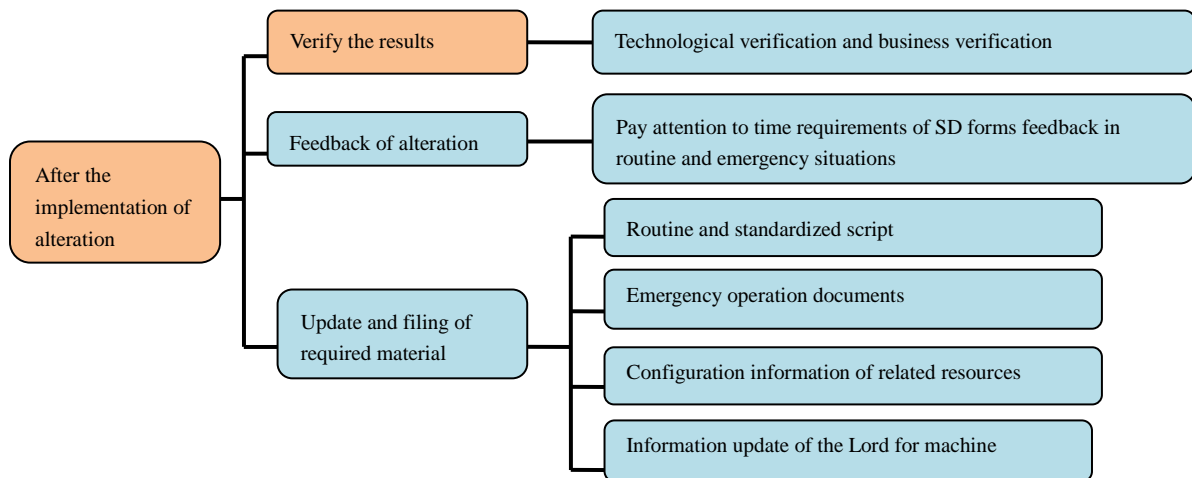


Figure 4. The optimization about the management after alteration.

minutes, at the same time the rates of non-standard drops to 9.6%, it means the aim of project implementation has been achieved.

### 5.5. The Control Phase (C)

Based on implementing the alteration management system, each department should strengthen the internal

control in every link of alteration (Especially the risk assessment, project review, department coordination before implementation and the risk control in the process of implementation, etc.), the safety production's alteration can be managed regularly in essence to achieve zero accidents, moreover try the best to have good production alteration management, event management, emer-



gency management in order to ensure that the system can operate stably and efficiently.

## 6. Conclusion

This paper has analyzed the present situation of information system in G bank and also the challenge it is facing. Furthermore, a scheme has been determined in this paper, that is the Lean Six Sigma management theory will be used to optimize the management of alteration and production in the G bank's ITSM. We try to achieve the four goals with DMAIC: the first one is optimizing the process and also improving the internal work efficiency. The second one is reducing the variation and the error rate and also improving the system availability. The third one is to strengthen the business interaction and have the IT value been reflected preferably. The last but not least, the overtime time can be reduced and employee satisfaction can be enhanced at the same time. Certainly, the Lean Six Sigma pursues perfection, so we need to make sure that the effect of program is "evergreen". Specific measures are as follows: 1) Long-term process ability has been set up; 2) The operation control plan has been updated and implemented; 3) Process has returned to process owner for maintenance; 4) The team final report, including the future improvement opportunities confirmation, etc.

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