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**THE APPLICATION OF SIX SIGMA IN THE FOREIGN
BRANCHES OF CHINESE COMMERCIAL BANKS**

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Abstract

The service quality has already been the focus of the managerial field. In China, this trend has raised the public concern as well.

Nowadays, the Chinese banks are exploiting the global market with hundreds of branches being established in all over the world. Meanwhile they are facing with plenty of problems regarding with the explosive growth. How could they find out the best way to improve their service and core competitiveness are the key problems which they are dealing with under the cruel competition environment.

Six Sigma, as a system method for continuous improvement, which can improve the performance of the organizations and make huge profits, is the first and best choice to enhance the quality of banking services. By carrying out Six Sigma projects, commercial banks call dig out their potentials, increase efficiency, deliver more excellent service, maximize the gain and achieve customer satisfaction.

Though Six Sigma is originated from the manufacturing industry, it is becoming more and more popular in service industry, especially in banking industry. Chinese commercial banks are facing an increasingly fierce market competition both domestically and abroad. Banking corporations care about the process of the service, the feeling of the customers, and the efficiency. It is important for them to deliver high level and standard services to customers even among large volume of transactions. Six Sigma can help banks to achieve this goal. It is proved that more and more world famous banking corporations gain successful results through Six Sigma projects such as Bank of America, Citi Bank, Wachovia, Wells Fargo, HSBC and JP Morgan Chase.

In China, China Construction Bank and China Merchant Bank have begun to adopt Six Sigma and have achieved substantial results. However, due to different environments, a variety of local laws and regulations and different customer segmentations, few foreign branches of Chinese commercial banks have taken such method into actions. Recognizing Six Sigma and finding the ways to be carried out are the most crucial and necessary measures to be taken at this very moment.

This article takes ICBC Milan branch transformation project as a case to study the feasibility and implement method of six sigma in the field of foreign branch of Chinese commercial banks, exploring the suitable path for them to implement six sigma management.

Key Words: Six Sigma, Foreign branches of Chinese commercial banks, Efficiency, Performance, Customer Satisfaction

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1 Introduction

1.1 Research Background

With the development of managerial methodologies, the global commercial banks are laying more and more emphasis on the implementation of these managerial skills in order to improve the efficiency and performance.

The goal of the commercial banks is to provide the customers with a service-oriented financial products. In China, there exist many kinds of banks: four state-owned banks, joint-stock commercial banks, city commercial banks and rural commercial banks. This fact leads to a very competitive interbank business. As some foreign banks keep entering into the Chinese market, there is also a huge impact on the domestic banking sector. With the development of the financial market, economic growth and disposable income of every citizens, the commercial banks are exposed to the dual pressure from customers and competitors: on the one hand, customers keep constantly increasing the requirement of products and services, which is the key of commercial banks to win the loyalty and satisfaction of customers; on the other hand, the competitors do everything possible to optimize the management structure in the overall process in order to get a larger market share and economic interests. To gain a competitive advantage by improving management efficiency has become the main direction of the commercial banks. As the most typical service provider in the field of enterprise and private services, commercial banks are closely related to operations and process from all aspects. All values, innovation and service need to rely on the business process flow from banks to customers.

Therefore, improving the process has become the basis of management efficiency throughout commercial banks. Actually, in some developing countries, the optimization and improvement of business process has become the core strategy in the banking industry. Years of continuous improvement lead to the fast response speed, good customer satisfaction and lower cost of service.

In China, the commercial banks are always in the dilemma that the improvement can't be

applied very effectively as they had expected. The main reasons are the following two points: First, the state-owned enterprise including the commercial banks always have the inefficient phenomenon that can't be changed in a short period. Since the domestic market has not been yet fully open to the world, commercial banks are lack of effective competition in encouraging and promoting factors. This facts make managers feel unconscious about the urgency and the importance of the change. Second, domestic commercial banks have not yet found an effective way to change the situation. Despite the success stories of management science textbooks and the useful reference provided by the advanced foreign banks, domestic commercial banks only see the huge economic cost, heavy basic work and scarcity of experience, so that most of the commercial banks feel the theories and methods too difficult to apply, and not suitable for domestic condition. Even though some banks have made some improvements in part of their business, but it's still non-systematic.

In sharp contrast, the competitors of the commercial banks have extended to the fund companies, insurance companies, securities companies. These companies not only absorb the diversion of bank deposit and loan business income, but also create a lot of new financial products which make banks feel great pressure. Therefore, commercial banks need to improve in a lot of aspects, like accurate understanding of customers' potential needs, acceleration of innovate new products, improvement of business process, so as to improve the service level, enhance customers' satisfaction and loyalty, and increase sales. This is the most typical path for the development of commercial banks.

In fact, these phenomenon also existed in some western banks during their early stage of economic development, but after a long period of exploration and practice, they have accumulated a considerable number of successful experiences. The Six Sigma management has played an important role in building process in banks and process of the re-engineering. It provides the commercial banks with a systemic and effective management methods and process. By applying the advanced software technology to the simple flow mode, Six Sigma can grasp the key to the customers' satisfaction and improve the elements of the system, so as to reduce the costs and achieve great improvement of efficiency. The implementation of the Six Sigma quality management process in commercial banks is to create a customer-centric, rapid response mode of operation of the market process. With continuous improvement

through process optimization, the commercial banks can improve the overall operational efficiency.

1.2 Thesis Structure

Chapter 1: Background introduction

Chapter 2: This Chapter mainly contains some literature review of Six Sigma, including its basic concept and history. By analyzing the features and application background of commercial banks in China, we summarize the advantages and implementation range of Six Sigma. This chapter also contains the tools and guidelines which can be used our research.

Chapter 3: This chapter contains general descriptions on ICBC Milan branch. It contains an interview with the managers and staff in ICBC and is aimed in finding out the existing problem which should be solved. By analyzing the information they gave us, we try to find the key points to the problem.

Chapter 4: This chapter contains the implementation of DMAIC method for ICBC Milan branch, including applying the models, modifying the processes, collecting the data and analyzing the results by different tools, generating the improvement plan and control the performance.

Chapter 5: This chapter contains the conclusion we developed after the case study of ICBC Milan branch.

1.3 Research Methodologies

The study in this thesis is based on a lot of literature reading and understanding, being combined with practical project application on a foreign branch of Chinese commercial bank which is ICBC Milan Branch.

Throughout the study, we decide to implement DMAIC Methodology into practice. Several research methods are applied to verify DMAIC, such as literature review, case study, interviews, questionnaire design and survey, data analysis, etc..

1) Literature review

In order to obtain comprehensive, in-depth understanding into the features and status of the

quality management of the global commercial banks and Chinese commercial banks, the authors did a lot of reviews on data, literature and journals from worldwide range. The information and materials are mainly from collection of books and literature from universities libraries of China and Politecnico di Milano, as well as research results from public internet, including outstanding master and PhD theses, EI, SCI, Google scholar, CNKI, Wanfang Data, etc..

2) Case Study

One of the author worked in ICBC Milan branch, which enabled them to obtain first-hand information on the bank, including the vision and mission, value propositions, organizational structures, main existing problem etc..

3) Interviews

From April 2013, the authors conducted in-depth interviews with both the internal staff. In this way first-hand information about the systematic and process problems, which lays the foundation for understanding the feasibility of project implementation.

4) Questionnaire design and survey

After the deep interviews with the staff, in May 2013, the authors prepared the questionnaire for understanding better the customer requirements and let the customers do the survey voluntarily. The questionnaires were issued to the clients, of which 53 valid questionnaires were ultimately returned. According to the returned data, we have a more clear picture on the real status of customers and the service which is provided by ICBC Milan branch.

5) Data analysis

The data analysis and processing in this project focus on the improvement of service quality and the customer satisfaction. We classify of customer needs, figure the status of banking service, analyze the existing problems. Then we did statistics on the useful data which we needed and analyzed them with the software of SPSS 19 for window.

2 Literature Review of Six Sigma and Commercial Banks

2.1 Introduction of Six Sigma

2.1.1 History of Six Sigma

Six Sigma originated as a set of practices designed to improve manufacturing processes and eliminate defects, but its application was subsequently extended to other types of business processes as well. In Six Sigma, a defect is defined as any process output that does not meet customer specifications, or that could lead to creating an output that does not meet customer specifications.^[1]

CEO Bob Galvin was always focused on improving the quality of Motorola products. Galvin found an ally in John F. Mitchell, a young engineer on the rise to becoming Chief Engineer. Mitchell was seen as a demanding, hands-on manager who cared for his co-workers and insisted on team effort.^[2] Mitchell believed in building quality into the engineering and manufacturing processes as a way of lowering costs and improving yield. He also favored competition among product lines and distributors as a business discipline to both reduce costs and to promote quality improvement. Mitchell's early successes with quality control appeared with the introduction of a new digital transistorized Pager, and the formalization of improvised Mitchell Quality Tests.^[3] Mitchell also used Shainin Methods and other tests in his operations. John F. Mitchell set the bar high for his engineers knowing they would respond. By the early 1970s, as John F. Mitchell was on his ascendancy to General Manager, Communications Division in 1972, Motorola had established itself as second largest producer of electronic equipment behind IBM, and as the world leader in wireless communication products, and had been battling Intel and Texas Instruments for the number one slot in Semiconductor sales.^[4] Motorola was also the largest supplier of certain parts and products to Japan's National Telegraph & Telephone Company, but at the same time, the Japanese were beginning to erode Motorola's lead in the Pager market. The rapid successes and expansion of

the Motorola Pager business created by John F. Mitchell, as cited above, led to competitive deficiencies in quality controls, notwithstanding the "Mitchell Testing."

In the late 1970s, as John F. Mitchell was on the ascendancy to being named President & COO in 1980, he was joined by other senior managers, notably, CEO Bob Galvin, Jack Germain, and Art Sundry, who worked in John F. Mitchell's Pager organization to set the quality bar 10x higher. Sundry was reputed to have shouted "Our Quality Stinks" at an organizational meeting attended by Galvin, John F. Mitchell and other Senior Executives; and Sundry got to keep his job. But most importantly, the breakthroughs occurred when it was recognized that intensified focus and improved measurements, data collection, and more disciplined statistical approaches John F. Mitchell's untiring efforts, and support from Motorola engineers and senior management, prevailed and brought Japanese quality control methods back to the USA, and resulted in a significant and permanent change in culture at Motorola. "We ought to be better than we are," said Germain, director of Quality Improvement. The culmination of Motorola quality engineering efforts occurred in 1986, with the help of an outside quality control consultant who joined Motorola, Bill Smith when the Motorola University and Six-Sigma Institute was founded.^[5] Two years later, in 1988, Motorola received the coveted Malcolm Baldrige National Quality Award which is given by the United States Congress. Later, the Six Sigma processes subsequently were adopted at the General Electric Corporation. Jack Welch said: "Six Sigma changed the DNA of GE."^[6] The Six Sigma process requires 99.99967% error free processes and products, (or 3.4 parts per million defects or less). Without the Six Sigma process controls, it may not have been possible for John F. Mitchell to launch the Iridium Constellation, one of the most complex projects undertaken by a private company, which involved some 25,000 electronic components, and took 11 years to develop and implement at a cost of \$5 Billion. Six Sigma processes resulted in \$16–17 Billion in savings to Motorola as of 2006.

2.1.2 Six Sigma Connotation

Six Sigma can be called the management of efficiency and quality. Its target is to improve the workflow by efficient quantitative measure, which requires that the defect rate should be less

than 3.4 in one million. Six Sigma has two meanings: one refers to the interpretation in statistics, the other refers to management perspective.

1) In statistics, Six Sigma describes quality level.

Sigma is used to present the standard deviation, which means the degree of dispersion. Any quality of programs or processes can be expressed by a number of Sigma. The Sigma level means the number of defects detected in a process or a program. The higher the Sigma level is, the higher the quality. If the Sigma level is lower, there will be more defects and the quality will be worse.

Sigma Level	Defects per Million Opportunity	Pass Rate(%)
6 Sigma	3.4	99.99966
5 Sigma	230	99.977
4 Sigma	6200	99.38
3 Sigma	66800	93.32
2 Sigma	308500	69.15
1 Sigma	691500	30.85

Figure 2.1 Sigma Level Conversion Table

From the Figure 2.1, One Sigma interprets 691500 defects per million and its pass rate is only 30.85%; while Six Sigma is only 3.4 defects per million. Its pass rate reaches to 99.99966%. The difference is enormous.

2) From the management perspective, Six Sigma is a management model

Six Sigma management is a customer-oriented management model based on data and facts. It takes measures for process improvement and put emphasis on preventive management. At the same time, Six Sigma is also emphasizing the non-border cooperation, in order to improve continuously and to pursuit quality and efficiency.

(1) Six Sigma is a management objective.

The aim of implementing Six Sigma is not to create a completely different company compared with the previous one. The concepts and tools used in Six Sigma are not to break the existing business process. In fact the philosophy is “Continuous improvement and the pursuit of excellence”. This concept can be understood as, to meet customer needs from the

perspective of existing practices and processes detailed, by using comprehensive and quantitative analysis, the implementation of Six Sigma methodology will bring improvements and breakthroughs. Six Sigma management is a gradual process. It starts from the vision to create near-perfect products and high customer satisfaction. This injects new momentum into the traditional management, and also make the quality improvement into profits.

(2) Six Sigma is a management philosophy.

A very important concept in Six Sigma is that all the solutions of problems should be based on the needs of customers, ultimately achieve customer satisfaction and win the customers' loyalties. In the Six Sigma management, Voice of Customer (VOC) is regarded as the foundation. VOC is the feedback of the information from the need of external and internal customers. Six Sigma management requires to launch a VOC project, whose purpose is to collect the customer needs, express their expectations and transform the information into the description of the products or services of the enterprise. These descriptions also needs to be collated and summarized into categories. Through the extraction of VOC, Six Sigma management can easily find out the critical to quality (CTQ) contained in the products. CTQ is defined as the features of the products and services which are essential to the customers. In a word, Six Sigma management is a customer-oriented management model which put the customers in the first place.

(3) Six Sigma is a management process.

Whether Six Sigma focuses on product design, performance assessment or customer satisfaction, process is always regarded as the key carrier of success. Six Sigma's most notable feature is to make sure that the process is only way to provide customers with competitive products in the market. Six Sigma handles all business operations from the perspective of process, and uses a series of concepts to describe and evaluate these processes, such as CTQ, defect per million opportunity (DPMO), process capability and so on.

(4) Six Sigma is a management approach.

It's more effectively to identify problems, analyze problems and solve problems if we have

enough data and facts. Six Sigma is such a systematic approach, which raise the “facts and data basis” into a higher level than traditional management approaches. In Six Sigma, the attention of the data use is throughout the whole process. It contains the identification of the key indicators, the collection and analysis of the critical variables and quantitative control of the optimized results. Therefore, the Six Sigma management is more willing to believe data rather than experience. By using a large range of methods and tools, Six Sigma tells us that all the results can be measured, improved and controlled in a certain way. All outputs are needed to quantify. There must be indicators to measure the quality of the products, and the services are also quantified according to certain rules.

2.2 Commercial Banking Features

The application of Six Sigma in Commercial banks is determined by its essential attributes as well as the perfect fit with Six Sigma. Commercial banking refers to deposits, loans, settlement and other financial services for enterprise and individuals. It's a kind of profitable economic organizations. Commercial bank generally belongs to the service sector, so that it must be based on good sense of service and quality in order to satisfy customers.^[7] Its business characteristics are mainly in the following aspects:

1) Standardization of object management and differences of services

Every bank is based on one or several currencies, and carry out operations such as consulting with the appropriate payment and settlement services, which are required by individuals and enterprises. Despite the fact the there are many differences between banks and services, even for the same service in the same bank, its specific content and effect is quite different according to different customers and bank staff. For example, for different financing projects, the designed programs and risks are different, so the bank services are absolutely different with the industrial enterprise product, which can be mass-product and are same in product design, process and performance. As a matter of this, it's not difficult to operate the ordinary banking business, but to do a good job is very hard. If there is not an effective measure or

supply chain, it's impossible to have a good place in the market. Because of the different needs of different customers, and the differences in process of services, it's difficult to form the market like a commodity market as the monopoly.

2) Delay of Business Risk

When industrial products and services are provided by the enterprise and are sold to a certain of numbers, it means the revenue realization. As long as there are no returns or complaints, the product value will be successfully achieved. The bank's products, especially loans, have higher risk rate. If the borrowers don't return the interest in time, or even fail to perform the payment, the loss of the bank is not only the income of the interest, but also all the investment in the loans. The risk of the loan before maturity is always accompanied by banks. With greater uncertainty and more uncontrollable factors, the longer the term will be, the greater risk the bank are facing with. This characteristic shows the importance of the bank loan risk review and management. It's quite necessary to establish a top-down effective control system and management information system.

3) Regional radiation of Products and Services

The products and services in bank has a range of radiation. Although there are a number of individual products have slightly larger range of radiation, the end is limited. For example, the business of ICBC Milan Branch are mainly for the Italian market, or sometimes extend to the some other surrounding countries, but it's limited to a number of large and medium enterprise and it's impossible to reach a comprehensive radiation. Because the household saving is supposed to be convenient, the scope of saving business is even smaller. This feature shows that the coverage of the bank services is commensurate with its network layout. If you have a certain network extends, you will be able to achieve business expansion and look for the development of space. Banking services are quite different with the industrial products which can be infinitely replicated and spread. Without the support from the bank agency outlets, the bank services can't develop. This explains that both in developed countries and developing countries, there are a large number of small and medium commercial banks and financial institutions in addition to large commercial banks. It's true that the range of banking services

have expanded a lot with the development of information technology, such as online banking, self-service facilities, etc., but they only make up the lack of bank branches in a certain extent.

4) High Mobility of Customers

Customers are dealing with the bank in order to obtain certain services or to obtain income or financing. The services are different among banks. This will affect the loyalty of customers. Anyway, customers always put the benefits as the primary objective.^[8] They have strong purposes. In addition, a bank's marketing efforts will affect the changes of its customer base. This analysis is important when a bank choose to enter a new market. They have to think about how to open up the market and to have a stable customer base. In fact, some kinds of bank services, such as residents' saving accounts, have a certain degree of customers' stability. These customers are paying more attention to the convenience of payment and investment. If the network institution is not covered, banks can improve the services to win this kind of customers. For the customers like companies and institutions, they have greater mobility regardless of their deposits or loans. The reason is that the payment and financing activities are homogeneous in different banks, and banks are restricted by their own deposit ratio, loan concentration, and the amount of a single loan. Banks can't fully satisfy all the needs of customers. Such as for some larger loan projects, small and medium commercial banks can't afford them. For the characteristics of these customers, banks need to create their own business features, such as high efficiency, good services, sensitivity to the new needs of customers and so on.

5) Banking Products Imitability

Since the banks are in the service industry, its service can't be unique and it's easy to learn. If a bank has a new idea, other banks will soon be learning, imitating and even developing. On one hand, this feature create a convenience for the commercial banks to imitate new products from other banks; on the other hand, it requires the commercial banks to develop a certain technical content of products to create competitive advantage.

Because of these characteristics, it's easy for banks in imitation of the products, market access and market development, but it's also hard for them to become bigger or stronger without their own advantages. Retaining customers and improving customer satisfaction are always the competitive long-term solution for banks.

From the marketing perspective, customer satisfaction is kind of feeling state of customers, in which customers are more likely to have trading behavior. However, if the banks are only in pursuit of the customer satisfaction, they cannot solve all the question. The improvement of customer satisfaction doesn't mean more profits of banks. This is the bottleneck that Six Sigma can breakthrough. The ultimate goal of Six Sigma is to improve quality by improving customer satisfaction, and to make an increase in operating profit.

Commercial banks keep eyes on service process, customer experience and service efficiency. Whether a company's information technology develops to what extent, mechanical or computer can't completely replace the human staff to provide the service to the customers. On the one hand it's difficult for a staff to convey a constant service because of his habits, appearances and other aspects of individual differences. On the other hand, frequent movement of service staff creates constraints in service value, efficiency and customer experiences. These objectives make the current banking service process face tremendous pressure, but also create a large space for improving services and customer experiences. Six Sigma has a great fit for this situation. It is a management method by numbers, and the vast amounts of highly information-oriented real-time data acquisition system create a unique condition for applying Six Sigma.^[9]

2.3 The Role of Six Sigma in Commercial Bank Management

- 1) Six Sigma is the critical path to achieve the objectives of the strategic plan in commercial banks.

Six Sigma management in commercial banks operating mode is based on the strategic plan and Voice of the Customer for clues to determine the need for improved or innovative products and service processes, and to take a scientific approach for improvements or innovation projects, in order to make continuous improvement and the pursuit of excellence

in the process. In this process, from the bank's overall strategic plan to the business sector's decomposition of the strategic plan, with the core process excellence management in every business unit, Green Belt research project can be derived. In the top-down view, this is a full line decomposition process of the overall strategic plan. In the bottom-up perspective, this is a summary of the strategic plan implementation. After the Six Sigma project implementation is completed, it will bring a significant improvement of the performance of the whole process, as well as improve the performance of the various functional departments and branches. In the end, Six Sigma will facilitate the achievement of the overall goal of the strategic plan, in order to improve the bank's overall competitiveness and level of profitability.

2) Six Sigma management changes the commercial banks to customer-oriented banks.

The customers of the commercial banks and their needs have greatly changed. Customers have expanded from the domestic to global, showing global, national, regional diversification pattern. Meanwhile, with the rapid development of the national economy and the improvement of personal income, personal customer demand for banking services from simple deposits, was quickly extended to credit cards, home loans, consumer loans, financial, etc. Increasingly diverse needs of customers demand is also necessary to grasp and excavation; financial markets become mature, and more and more service providers enter the market in an effort to provide an alternative product homogeneity; financial products are becoming mature, and financial products from a single savings and loan into a fit different needs of customers of professional products. Meanwhile, with the development of modern IT technology and the spread of information technology, the burst of technology makes it easier for customers to understand and compare different banks for similar products. At the same time it's also easy to replace banking service provider.

With the rapid changes in the market and customers, the main direction of the banks is gradually transformed from expansion to quality management and market size exploring. The banks must understand "customer-centric", and accurately identify the customer's real effective demand, in order to provide the customers with the products and services which they really want. In the long term perspective, the banks with excellent operation and service will be the real winner in this area. One of the core themes of Six Sigma is the "real customer

focus". Six Sigma always pays attention to the "customer's voice", and uses structured methodologies and a range of statistical analysis to get the CTQ from the customers' needs by identifying and analysis. All this makes the companies know more than the customers themselves, and define the needs of customers as a measure of improvement. Through the breakthrough improvement completed by the implementation of Six Sigma, Six Sigma finally realizes the satisfaction of the customers, as well as significantly improves customers' loyalty and retention.

3) Six Sigma management transforms the functional management into process management in commercial banks.

Like most of the business, the implementation of the strategy in commercial banks is carried out by various functional departments. The daily management usually puts focus in the monitoring and assessment of different departments and their leadership responsibilities. Under this kind of top-down management system, each department considers its tasks and functions as the main target and they always forget that they are playing an important role in providing the services which aim is to satisfy the customers. As a matter of this, the services provided to the customers is divided into a series of relatively loosely linked tasks and orders. There exist many "gray zones" of process and responsibility among all the departments. The voice of customers is lack of transmission, analysis and improvement. This inevitable effect will cause service fluctuation and customers' dissatisfaction.

As a customer-oriented profitable business, all the activities in commercial banks must meet the customers' needs as well as make profit as more as possible. From the customer's point of view, they only concerned about whether their needs can be met effectively and efficiently. As a matter of this, commercial banks must think about their operational model. It's necessary to coordinate the management of departments with horizontal core process management, thereby enhancing the operational performance of commercial banks. The implementation of Six Sigma is to make all processes customer-oriented, thus makes all the activities in the process valuable.^[10]

4) The benefits of Six Sigma in Commercial banks

As Six Sigma is an advanced master of performance improvement method, its core is based on the continuous improvement of customer-oriented processes, which can strongly improve the customer market performance ("effects") and bank operating performance ("efficiency"). Specially, mainly reflected in the following aspects:

(1) Reducing the time cycle

The required time for commercial banks to provide customers with products/ services is called service time cycle. By reducing cycle time, the banks can accelerate market response capabilities in order to improve customer satisfaction and loyalty, which greatly enhance the commercial banks to improve operational performance.

(2) Reducing errors

During the process in which commercial banks provide services to customers, due to the work procedures, equipment, operations, staff and other reasons, there will be a variety of mistakes and errors. These errors will decrease the customers' satisfaction and rise cost of banking operations. It's necessary to keep improving the operational performances by reducing errors.

(3) Improving efficiency

Commercial banks are based on currency operating. The efficiency of the use of funds will directly reflect the level of overall operational efficiency. Higher operating efficiency means lower costs and higher profits. For example, Six Sigma can help to improve and enhance the commercial banks' risk management, to reduce bad and doubtful debts for the utilization of funds. This can enable banks to have more money into asset management.

2.4 The Range of Applications of Six Sigma in Commercial Banks

From a number of successful stories of Six Sigma, we can figure out that Six Sigma is suitable for almost all the processes, but is that true? Especially to the commercial banks, whether all the business processes can become a Six Sigma project? The answer is obviously negative. Before we explore the implementation of Six Sigma in commercial banks, we need to first analyze the various business lines within the banks and its process and choose the most suitable process scope.

According to the different objects of banking services, we can divide the commercial banks'

business into two categories: retail and wholesale business.

The retail business, also known as personal financial services, is mainly for individuals. It involves a relatively small amount of funds compared with other bank business. More precisely, the retail business is a comprehensive and integrated customer-oriented financial services which use modern business philosophy and high-tech. It includes features currency exchange, savings deposits, consumer loans, valuables and personal trusts and other traditional personal financial services. It also includes wealth management for individuals and families, financial advisory, credit card, insurance policies, retirement plans, securities brokerage and other innovative financial services.

Wholesales business is for enterprise, institutions and social groups. It involves banking with a large amount of fund, also known as industrial and commercial financial services. It includes the lending business (specifically as working capital loans, term loans and project finance, bank guarantees, commercial bill acceptance and discount, etc.), funds management business (specifically as liquidity management of accounts receivable, payment management, liquidity management, etc.) trade services (specific operations such as import and export business, e-commerce services, etc.), investment activities (such as fixed deposits, structured deposits, etc.) and so on.

Overall, Six Sigma is more applicable to those business processes which have low degree of repetitiveness, easy control and low level of complexity in each part of the flow. In the following picture, we classify the main banking business processes according to their volume of business and complexity.

Banking Processes Classification Matrix

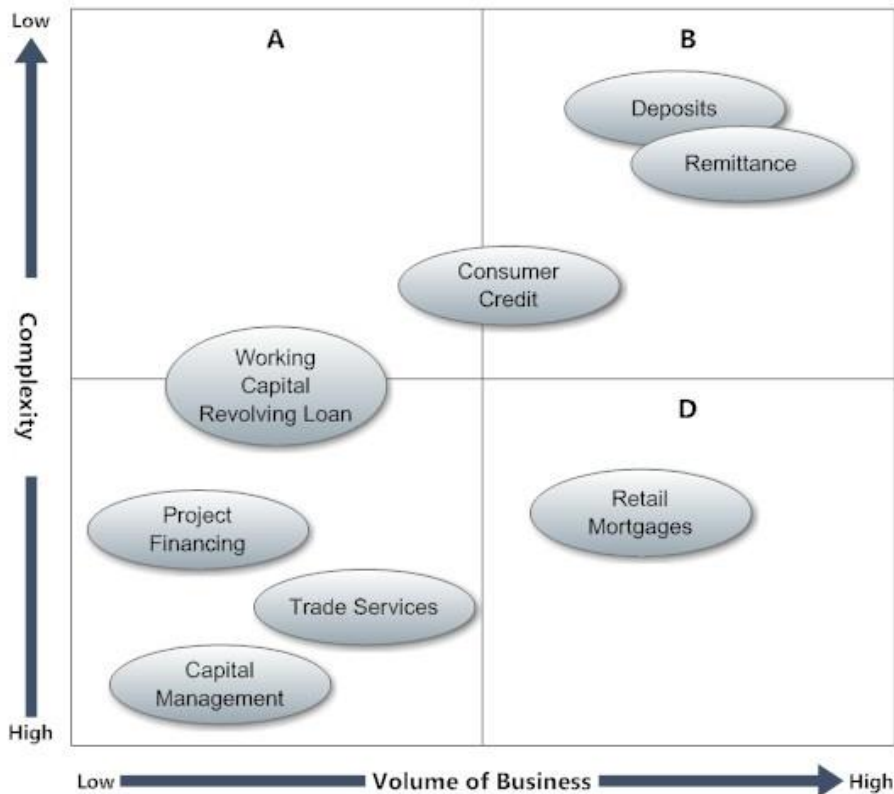


Figure 2.2 Banking Processes Classification Matrix

Note:

Region A and D: Available as Six Sigma project;

Region B: Priority as Six Sigma project;

Region C: Not suitable for Six Sigma Project;

Banking processes in region B are no doubt the best choice for Six Sigma project. They're characterized by high volume of business and low complexity. For example, remittance business has a large proportion of orders in the daily transaction in a bank, while its process is simple both in the desk and background. However, because the customers usually do not submit the accurate remittance information during their first remittance, the background system needs more human and material resources for the correction of the errors which are from the inaccurate information. This factor not only causes much waste of resources, but also lower the customer satisfaction, which further affected the goal of the entire banking profitability. By applying the Six Sigma management during the remittance, the team can

design a series of tools to help customers provide accurate information in order to solve the problems radically. Many steps will be improved after the application, such as reducing the queries investigation work of remittance and reducing the average processing time. All these changes will bring the improvement of customer satisfaction and ultimately increase the bank's profits.

The banking processes in the region C cannot become a Six Sigma management projects due to its small volume of business and relatively complex features. From the scope of the business point of view, since these banking processes can be only applied to corporates, the frequency of occurrence is clearly much low; from the point of view of business operations, some professional knowledge must be used to design banks win-win solutions and enterprise management according to the actual situation of the corporates. This process is obviously complex. Moreover, to the different business groups, the management solutions provided by banks will also be very different due to their size and the different stages of growth. There is no typical process as a standard solution. Therefore, we believe that Six Sigma is not suitable to these kinds of business.

The banking processes in region B and C are partially meet the Six Sigma project selection features, so that Six Sigma can be used in these regions occasionally. The reason is simple. Due to the small scale of processes, or due to the high complexity of the process, even though the implementation of Six Sigma projects can be successful, their benefits is not prominent, at least not important enough to make all the employees recognize the values of Six Sigma management.

Of course, this classification is not absolute. With the maturing development of commercial banking business and each bank's own professional advantage, some banking business which is not suitable for Six Sigma today may be more successful in the future by applying Six Sigma.

2.5 Some Managerial Guideline of Six Sigma

2.5.1 DMAIC

1) Introduction

DMAIC six sigma management is the most important and most classic management model, focusing primarily on quality improvement in existing processes. All Six Sigma management related to professional statistical tools and methods throughout the link of each of the six sigma quality improvement projects.^{[11], [12]}

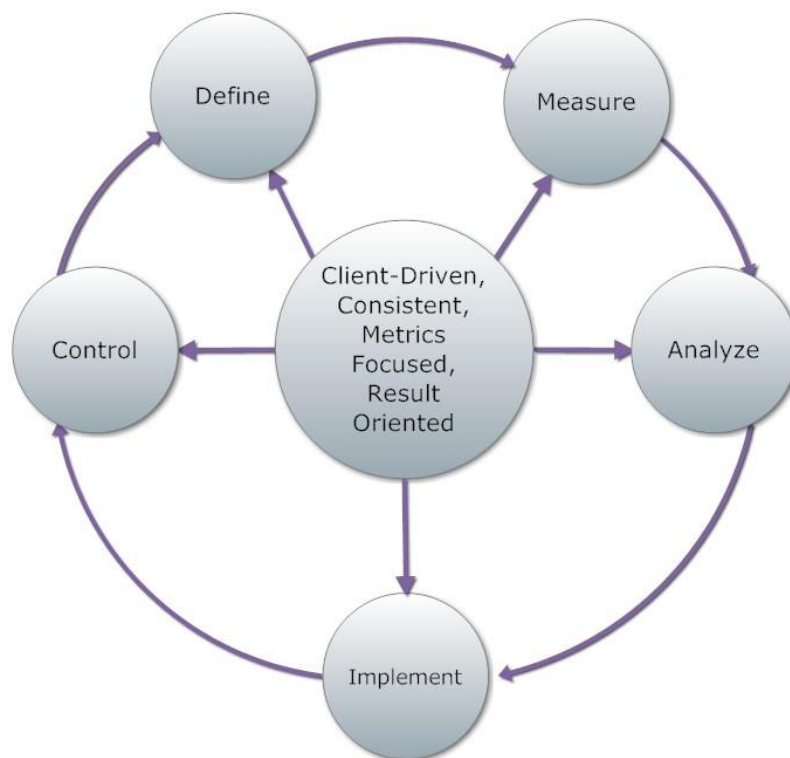


Figure 2.3 General View of DMAIC

2) Main Steps:

(1) Define

Objective: Launch an improvement project, define project objective/outcomes, select team, define responsibilities, create high-level project plan, identify sponsors/key stakeholders, and prepare a communication plan.

Some key issues:

- What are you doing?
- Why should solve this particular problem?
- Who are your customers?

- What are the needs of your customers?
- What are you used to do to solve it?
- What are the benefits you can get from the improvement?

Key tools:

- Project Charter
- Stakeholder Analysis Template
- Communication Strategy and Action Plan

(2) Measure

Objective: Create high level process map, obtain client input, priorities and CTQ's, gather initial data/metrics, determine current process Sigma level, develop initial value proposition, make Go/No Go decision.

The measurement is the basis of the analysis of six sigma management work, since it can help to collect CTQs (Critical-To-Quality). Measurement makes the quantitative management and the application of statistical techniques possible. In order to get a true, accurate, reliable data, it's necessary to calibrate the measurement system.

Key Tools:

- Process Map
- Customer interviews/Focus Groups/Surveys
- CTQ specification
- Pareto

(3) Analyze

Objective: Analyze data collected during Measure to determine why the process perform as it does today, identify and quantify cause and effect relationships.

After we've obtained the necessary data by assessing the current performance stage, we need to look for the cause of the problem. The analysis phase is to identify potential problems and it often requires multiple analysis of statistics, data and facts to find out the real impact of the key factors of the current performance.

Key Tools:

- Cause-Effect Diagram
- Scatter Diagram
- Benchmarking
- Value/Throughput Analysis

(4) Improve

Objective: Identify improvement breakthroughs, identify high gain alternatives, select preferred approach, design the future state, determine the new Sigma level, perform cost/benefit analysis, update CSA, design dashboards/scoreboards, create a preliminary implement plan.

To find the best solution to improve key indicators and quality characteristics, and then to develop an action plan which should be implemented with certainty. Tests are continuously needed in order to observe the improvement. These tests help to judge whether the solutions are effective to reduce errors or not. Therefore, if the improvements have no effect, performance evaluation and cause analysis must be repeated. Until the improvement measures have a positive effect after several cycles, it's allowed to proceed to the next stage.

Key Tools:

- Brainstorming
- Storyboarding
- Cost/Benefit
- Sigma Calculation

(5) Control

Objective: Run the new process, continuously improve the 'engine', report dashboard and scoreboard data, create feedback loop for areas of focus, adjust as needed, identify replication opportunities.

Only continuous measurements can avoid errors from happening again. The control is to secure the effective improvement. If the effectiveness of the improvement is stable and obvious, the staff can develop the system to make the process standardized and normalized. Many process improvement program in the past tended to ignore the concept of control. In the

Six Sigma improvement, control is the key to the quality and cost from the long-term perspective.

Key Tools:

- Control Chart
- Histogram
- Storyboard
- Sigma Calculation

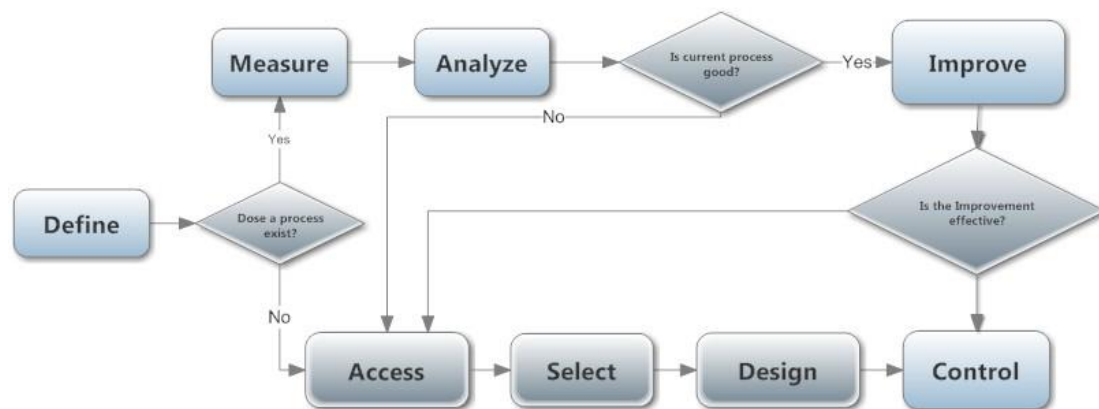


Figure 2.4 Flowchart of DMAIC

In a word, the expecting result is always difficult to be achieved at once. When the old issue is resolved, there may still be a legacy problem or create new problems. Only after several times of improvement in accordance with the DMAIC model, the continuous improvement effect can be revealed.

2.5.2 DMADV

1) Introduction

Paxton has been in the financial services industry for more than 10 years. Previously, he was senior vice president of Operational Excellence at JPMorgan Chase, and senior vice president, Global Quality & Productivity Process Excellence at Bank of America.^[13]

"Ten years ago, many financial institutions were wary of using DFSS tools and thought of

them primarily for application in manufacturing industries," Paxton said. Additional apprehension centered on a misperception that massive technology deployments had to be part of DFSS solutions. Today, he added, DFSS is being embraced for its ability to provide robust designs for reengineering existing processes and products and developing new ones.

"Financial services today are very similar to large technology organizations; relying upon a complex network of interrelated processes and systems to deliver quality products and services for their customers," Paxton said. "By taking an end-to-end view, and designing across functional boundaries, new levels of performance and quality can be realized. This is where DFSS is a perfect fit, and can help bridge the gap between business and technology."

DMAIC process optimization of product quality still has limitations. The practice shows that at least 80% of the product quality is determined at the early stage of design, so that the effectiveness of the DAMIC improvement process is limited without DFSS. With the further research of Six Sigma, experience shows that once the capacity of the flow reached around 4σ to 4.5σ , it's difficult to achieve a breakthrough on the further improvement of the process. It is definitely necessary to implement DFSS, in order to really achieve to the 6 sigma level. DFSS is a non-defective product and process design. It is based on the idea of concurrent engineering, full life cycle of product-oriented system solutions, financial key customer needs in product design process, so as to ensure the speed and quality of product development, reduce product life-cycle costs, provide an efficient way for enterprises to solve the problem of product and process design. DFSS is corresponding to the DMADV theory: Define, Measure, Analyze, Design and Verify.

2) Main Steps:

(1) Define

The team at first create a project plan, which identify the requirements and objectives of the product according to the customers' needs. At the same time, the team should also have a clear view of the resources needed in the project and the limited conditions.

(2) Measure

The team confirm the ways of acquiring the customers' needs, and put them into the Voice of Customer (VOC). By analyzing the VOC, the team can transfer the information into the actual requirements which the customers really want, in order to identify the key measure of CTQ.

(3) Analyze

The team analyze the data from Measure to develop a number of high-level designs, and select the optimal design plan.

(4) Design

Implement the product development planning to minimize the differences of the product or process (robust optimization) and adjust the output information to achieve measurable indicators.

(5) Verify

The team keep doing verification and data collection, in order to further improve and optimize new products and processes.

2.5.3 DMAIC vs. DMADV

DMAIC and DMADV are both tools for Six Sigma quality improvement, but they have many differences in different perspectives.

The aim of DMAIC is to improve the existing process in order to improve the existing products or services.

DMADV is suitable for creating a new product or service. If the existing products or services are not acceptable and need great improvement, DMADV is also recommended.

Although DMAIC and DMADV have some similar steps in operation period, their aims and tools are much different.

Here is the table of the differences of the steps between the two methods in detail.

Difference between DMAIC and DMADV	
DMAIC	DMADV
Define: (1) Develop a clear definition of the project (2) Collect the background information of the customers' needs	Define: (1) Develop a clear definition of the project (2) Develop the plan of the project, risk and resources
Measure: (1) Collect information in order to provide a clear situation of the improvement result	Measure: (1) Collect the VOC (2) Transfer the VOC into CTQs (3) Identify the most significant CTQs
Analyze: (1) Find out the main factors of the defects (2) Affirm these factors according to the data	Analyze: (1) Assess and select the best plan to suit the CTQs according to the budget and resources
Improve: (1) Develop the solution of the problem by experiments (2) Assess the solution and form the implementation plan	Design: (1) Develop a high-level and detailed design (2) Test every parts of the design (3) Prepare for the experiment
Control: (1) Maintain the result by the standard improvement process (2) Prospect the improvement in the future, and record the experiences during the improvement process	Verify: (1) Run the experiment and test the prototype (2) Apply the design

Table 2.1 Difference between DMAIC and DMADV

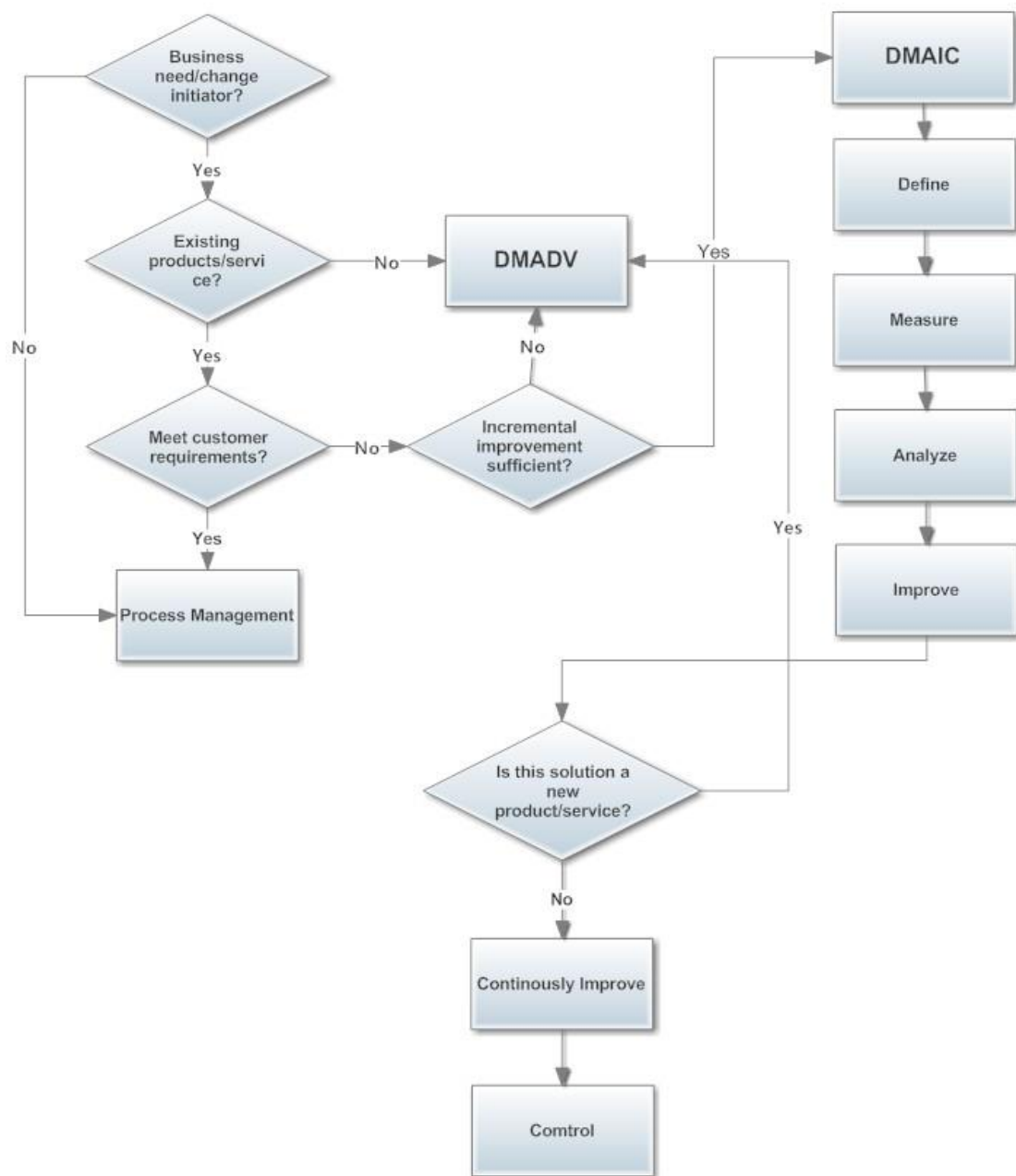


Figure 2.5 Flowchart of applying DMAIC or DMADV

This figure shows in which condition DMAIC or DMADV is applied. It's clear that DMADV is used for a relatively new process while DMAIC is the improvement for the existing ones.

2.6 Conclusion of the Review

Thus, due to the facts that the business operations of the banking sector have strong regularity, high repeatability, and relatively standardized process, there is a good environment for Six Sigma to be applied. By applying the Six Sigma management approach, the commercial banks can analyze the current process and try to improve by integration or reconstruction, in

order to significantly improve the quality of the service as well as to achieve maximum benefit. Therefore, Six Sigma management approach is applicable and effective in the financial service industry, especially in commercial banks. When the commercial banks keep enhancing the research of the Six Sigma management, they can effectively improve the customers' satisfaction, reduce the operating cost of the bank, improve efficiency, and further strength the overall competitiveness of the bank.

3 Analysis on the managerial environment and status of ICBC Milan Branch

3.1 ICBC Profile

Industrial and Commercial Bank of China Limited (“ICBC” or “the Bank”) was incorporated on January 1, 1984 with headquarters in Beijing. The Bank was wholly restructured to a joint-stock limited company on October 28, 2005. On October 27, 2006, the Bank was listed on both the Shanghai Stock Exchange and The Stock Exchange of Hong Kong Limited.

ICBC has a leading market position and boasts an excellent customer base, strong innovation capabilities and outstanding brand value. It has formed a global service network across Asia, Africa, Europe, America and Australia, as well as a commercial bank-oriented, cross-market diversified operational pattern. The Bank provides superior and efficient financial services for 4.11 million corporate customers and 282 million personal customers by virtue of the service network consisting of 16,648 domestic institutions, 239 overseas institutions and 1,669 correspondent banks worldwide, as well as through its E-banking network comprising a range of online banking, telephone banking and self-service banking. The Bank not only possesses competitive edge in traditional businesses such as deposits, loans and settlements, but also maintains a leading position among domestic banks in most of the emerging businesses. ICBC is one of the large financial institutions in the world with the fastest growth, and maintains its position as the world’ s No.1 listed bank over the past years in terms of market capitalization, profit, customer deposits and brand value. The Bank won over a hundred titles and awards each year such as “Best Bank in China”, “Best Bank in Asia” and “Best Bank in Emerging Markets”.

3.1.1 ICBC Corporate Culture

1) Mission

Excellent for you — Excellent services to clients, Maximum returns to shareholders,
Real success for our people, Great contribution to society

2) Vision

A global leading bank with the best profitability, performance and prestige

3) Value

Integrity leads to prosperity

Basic dimensions of Value

Integrity, Humanity, Prudence, Innovation and Excellence

4) Brand image

A reliable bank that's always by your side

3.1.2 Business Strategy of ICBC Milan branch

1) Advantages of brand:

Making the most of the advantages of ICBC, creating group synergy to provide a 360 degree service for commercial companies both Chinese and Italian as well as Chinese companies with subsidiaries or investments in Italy.

2) Integration into the local market:

Using Italian corporate clients with investment in China and Chinese customers in Italy as a starting point for other customers develop gradually and then quickly integrate into the local market.

3) Steady growth and healthy:

Actively address the changes in the international financial situation, in line with the vision of overall development of ICBC HQ; ability to focus on key issues and intervene quickly; apart from the competition to penetrate more easily into the local market and strengthen the services for faster integration, commit to becoming a financial services institution of the first order in a relatively short period of time.

4) Development and Service:

Starting from services such as deposit remittances, clearing and cash management, creating an integrated financial services platform and unique; enhance co-operation with the best clients in trade finance their supply chains and to try to participate in major projects funding as project loans and syndicated loans; expand the market share of specialized products such as loans to shipyards and structured finance.

5) Communication and collaboration:

Improving communication and collaboration with local correspondent banks, to promote cooperation in the field of syndicated loans, trade finance risk participation loans, fund lending in domestic currency and foreign transactions in RMB cross-border commercial activities and so on.

3.1.3 Organizational Structure in ICBC Milan Branch

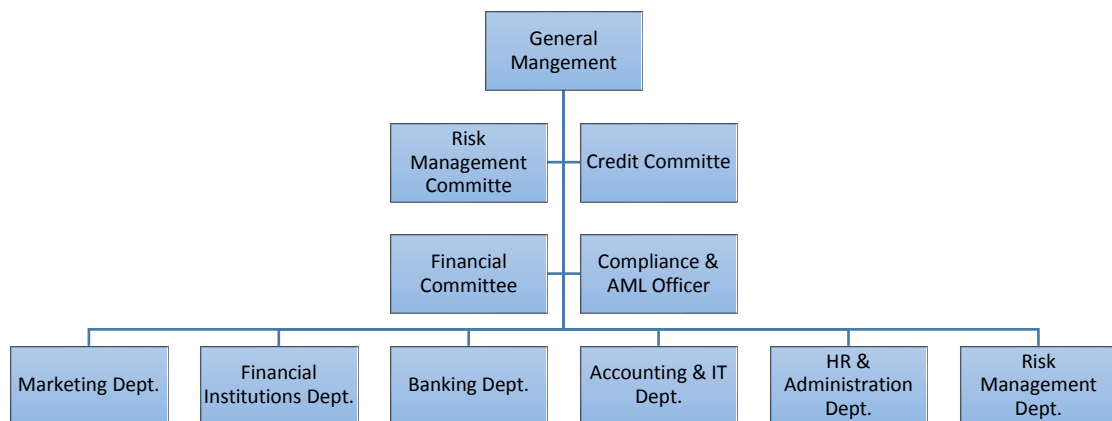


Figure 3.1 Organizational Structure of ICBC Milan Branch

General Description on the Departments

1) General Management

There are one general manager and one deputy manager in Milan branch. They are in charge of setting strategic plans of our branch, authorizing the important transaction etc..

2) The accounting and IT Department:

The accounting group contains three employees. They are in charge of administrative

accounting and the bookkeeping into the FOVA system etc..

The IT group is composed by three people. They are in charge of daily maintenance, requirement management, procurement etc..

3) Banking Department:

The banking department, which is the core operation department in our branch, consists of six people. They provide banking service to the external and internal customers. Their operations should be executed under FOVA platform, which keeps being developed under the NOVA platform. Since our branch was newly established two years ago, there exist a lot of requirements to be satisfied and functions to be added into FOVA system.

4) Risk management Department:

It has two employees. They evaluate the risk level of each transaction and judge whether to authorize the permission or not.

5) HR & Administrative Department:

Two people are working in this department. They are in charge of executing daily administrative works and doing regular HR jobs.

6) Marketing Department:

Two Chinese and four Italian are employed in this department. They are in charge of exploiting the markets, finding new potential and qualified clients, coordinating the clients' demand and the real ability of our branch etc..

7) Financial Institutions Department:

FI department is composed by four people. They need to provide financial service to the clients.

8) Compliance & AML Officer:

She focuses on improving and controlling the all procedure of the transactions and all the daily works are under the Italian regulations and laws. Anti-Money laundry is the core of her job as well.

9) Risk management committee:

It is composed by all the heads of each department and general managers. They have a regular meeting in each month, concluding the risks in each specific issues happened in the previous month and checking the improvements after the last committee conference.

3.2 Interview with the Teller and the Head of Banking Department

In order to have a clear view on the banking system, Zhicheng(Z in short) had an interview with the teller(T in short):

Z: How long have you worked here?

T: I've been here for one year. Though I didn't work since the very beginning of our branch, before coming here I had working experience in another branch in China for four years.

Z: Is there any difference between working here and in China?

T: Of course. The FOVA system we are using now is developed on the platform of NOVA system. They are similar but modified in some sections for meeting the needs of foreign market which leads to difference in transaction process. Despite of the unexpected inconvenience, I have to get used to this environment.

Z: Can you give a brief introduction on FOVA system?

T: OK. FOVA is a centralized banking system used in every the foreign branch of ICBC, integrated with all the necessary operations being used in different transactions. In order to set good examples, the ICBC headquarters laid a lot of emphasis on supporting ICBC Asia (located in Hong Kong) and ICBC Macaw, since they are pioneers of the foreign ICBC branches. All the banking system of ICBC foreign branches, named FOVA, are developed on the base of the system of these two branches. All the operations of banking system can be done and should be recorded and proceeded in the FOVA system.

Z: Can you describe the problem caused by the system?

T: Well. I think one of the problem could be the compatibility. Each foreign branch has its own specialties regarding with different local regulations. In order to overcome the conflicts between FOVA system and the local regulations, most of the foreign branches have to add new additional procedures, the majority of which should be done manually, to meet the needs of both sides, decreasing the efficiency to ensure security level. Meanwhile there are some

functions in the FOVA system which are not applicable to other foreign environment. But we are keeping improving the system step by step. Since the most important point for software development in ICBC is security, the general pace is not that fast.

Z: Except for the systematic problem, can tell me about the problem related with process?

T: From my point of view, there are too many transaction codes to insert within one transaction which is caused by the not well compatible system as I mentioned before. In some cases, we have to combine a lot of specific sub-transactions together in order to satisfy both the banking rules and the local regulatory requirements, which makes the process time-taking and complex. Some problems of the devices slow down the process speed as well. For example, we have to wait five minutes for the printer normally. Our IT couldn't find the solution which is obviously a negative aspect to our efficiency.

Z: Do we have customers waiting in queue during your working hours?

T: Normally there will be a couple of customers waiting in the hall. But in some cases, when there came a lot of customers and I was processing some business with complicated procedures, lots of customers had no choice but waiting in the queue.

Z: How long does it take for processing one transaction?

T: Well, it all depends on the complexity of the process. For example, if the customer came for deposit and withdrawal, there would take more or less ten minutes. If the customer came for opening an account, however, it would take at least 45 minutes.

Z: Why it take so long for procedures like opening an account in ICBC?

T: Maybe it's astonishing for you. But we are making compromise among the ICBC Banking system, local regulatory requirements, anti-money laundry pressure, which make the system not user-friendly enough. The general idea for our banking system is to ensure the security level.

Z: How long should a customer wait normally in the queue?

T: From the view of the customers, waiting is never a pleasant experience and in our branch this phenomenon is even worse. For the average waiting time, it all depends. When the customer came and there's nobody in the queue, there's no need to wait. But if a lot of customers were in the queue, the extreme would be hours. But generally speaking, it could be more or less half hour.

Z: Do you have any suggestions?

T: Yes, of course. Firstly, it would be much better if the system could combine the transaction code together, meeting the need of all aspects, which ought to reduce a lot of my work load. Secondly, I hope we could find out some better ways by ourselves, increasing both the efficiency and customer satisfaction, without which our service level could not be improved.

Afterwards, Zhicheng had a clearer picture on the banking situation. Then he another interview with the head of the banking department (H in short) with the aim of knowing better the general procedure of making improvements on the system.

Z: Sir, if you figured out some problems within the system or you collected special requirements from your customers, what will you do to improve the system?

H: Normally, we analyze the external requirements from the clients and the internal requirements from other departments within our branch, after which we will have discussion with the compliance officer and IT group, checking whether it would be feasible to add new functionalities to the FOVA system from both statutable and technical point of view. If we draw to the positive conclusion, the IT staff start to write the requirement paper, describing in technical way the demand the customers and the required functionalities to be set into our system. Once we had any doubts during the writing, we would discuss with banking department again to clarify the uncertainties. We will check the requirement paper to eliminate all the uncertain information. If there existed any, we would inform the IT people to modify the paper and check it after modification. If the banking, IT and compliance officer confirmed that paper, the IT manager would deliver the it to the headquarter of ICBC in China. The engineers would check the feasibility and existing problems in order to make sure that they completely understood the requirements which our bank needed. Afterwards, the

software team start to develop the functionalities we need. After finishing the development, they will test the applications by themselves and other departments which are in charge of software testing. They would setting into production only after test. Since if the functionalities being added are not stable or applicable, there might lead to serious lost to our branch from operative perspective. Though the procedure seems to be perfect, the banking department can still figure out an amount of problems, such as lack of some specific functionalities, instabilities, executing errors etc.. Then we had to declare the errors and trying to fix them.

Z: How long would it take to fix the new problems?

H: Well, the whole procedure is quite complex and can be last for months. If it's a small bug, there takes several days for fixing it. If the application is even complicated, it would require for years. We are eager to improve the efficiency of the systematic improvement procedure indeed, though we know it would be quite difficult. Therefore we think that maybe it's more realistic to figure out improvements on the transaction procedures.

3.3 Conclusion after the Interviews

After these two interview, we have an integral comprehension on the real status of banking process and its corresponding system.

- 1) Although ICBC branches in China have been set complete management system with all the processes having already been standardized, the Milan branch still have some problems due to the changed caused by different social environment.
- 2) The systematic improvements are inefficient since they are limited by the capability of software development cycle. Therefore it would be more feasible to figure the problems in the process.
- 3) We focus on analyzing the transaction processes, trying to improve the efficiency and customer satisfactions. For example when the banking department receive the internal and external requirements, how can they make positive response in the shortest time? How to improve the service quality of transactions? How to implement modern managerial methodologies to the branch? Etc.

4 The Implementation of DMAIC in Improving the Service Quality of the Bank

4.1 General Descriptions

The target bank to be researched on is ICBC Milan branch, which is located in Via Tommaso Grossi, 2, 20121 Milano. In this chapter, we would like to figure out the most suitable methods to the problems, implementing the model, collecting the data, modifying the processes, analyzing the results and setting up a relevant mathematical model.

4.2 Design of the Project

- Process Definition

Bank counter services: To meet the customers' needs timely conveniently and safely. For details, please see the second part of SICOP analysis.

- Process Description

Process Start: Customers enter the bank.

Process End: Customers leave the bank after they finish their business

Opportunity Description: Bank counter services are an important part of the overall service quality since customers are directly involved in the process. Improving the quality of the counter's services can both improve customer satisfaction and enhance the bank's core competitiveness.

- Problem Description

As the branch is located in the city center, it's the only branch of ICBC in Italy. The effective daily arranging number reaches to 150. According to the Voice of Customers, it often occurs that customers are always complaining about the long waiting time and poor services of the counter.

- Project Objectives:

(1) According to the analysis of the VOC, we will try to limit the longest customers' waiting time up to 20 minutes. Average customer waiting time should be less than 10 minutes. The

standard deviation of the waiting time should be shortened to 5 minutes.

(2) Analysis and improvement of the details about the counter's services.

5) Project general procedures

We are going to implement DMAIC method to study on this project. The general steps are defined in the following.

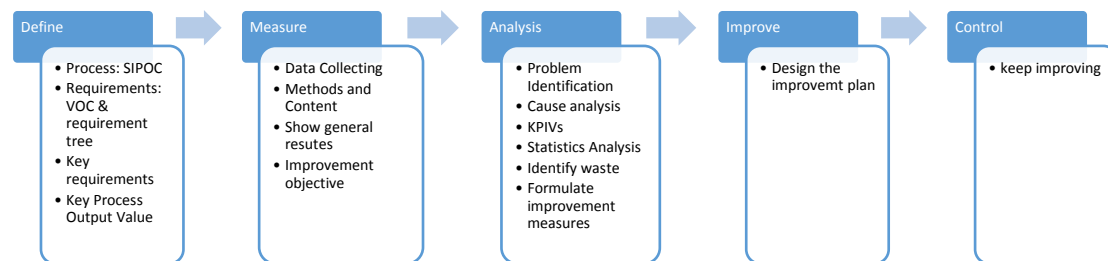


Figure 4.1 General steps for implementing DMAIC in ICBC Milan Branch

4.3 Implementation of the Project

4.3.1 Define

During the definition phase, the main task is to identify and determine the characteristics and needs of the customer service outlets, and to identify the existing service flow chart.

4.3.1.1 Define the objectives of the project

Project definition phase has changed the traditional thinking which is based on the bank's manager. The bank should regard the customers' needs as their starting thinking point, and set the project objectives according to the analysis of VOC. We will be customer-centric, use the scientific division of functional areas, plan the business processes rationally and finally improve the quality of the network services.

4.3.1.2 Define the range of the project

In the ICBC Milan branch, according to the local customers' needs, we will redefine the role of the internal work, re-planning the network service processes, and improve service quality and performance.

4.3.1.3 Define customer requirements

The Quality, especially service quality, is driven by customers. Listening to VOC (Voice of Customers) and fulfilling customer requirements are the keys to improve counter service quality.^[14]

1) Voice of the Customer (VOC) is a systematic approach for incorporating the needs of customers into the design of customer experiences. The term is used to describe the in-depth process of capturing the customers' expectations, preferences and aversions. It produces a detailed set of customer wants and needs with the customers' own language, which can be used to identify the Critical to Quality (CtQ) for a customer-focused business strategy. The objectives of listening to the Voice of the Customer are:

- Generate a detailed understanding of the customer's requirements and utilize them as a key input for the model.
- Develop further insight into the banking service with reference to the Voice of the Customers.

2) Three steps of VOC to be implemented:

- Identify customers and determine what we need to know.
- Using proactive approaches for collecting data
- Analysis data to generate a key list of customer needs in their language.

3) Identify Customers and Customer Needs

The target customers are identified at first. There are two types of customers: the internal customer and external customer. The former one is the next process in the requirements flow of the service procedures within ICBC, e.g. marketing department, financial institutions department etc.. While, the external customers are those who receive the service outside ICBC. Our research of VOC will focus on the external customers who come to ICBC for transacting businesses.

4) Data Collection and Analysis

Basic VOC systems including reactive systems and proactive systems. In the reactive systems,

information can be obtained without taking actions, while in the proactive systems, we need to put effort into gathering the information such as conducting market research or customer interviews. Since the business has already been established and there are few data for reference, we focused on the proactive way of VOC.

In order to gather more focused information about the needs of our customers, proactive methods are utilized to contact with customers for data collection. Typical methods are interviews, focus group and surveys. Based on what we have already learnt about the customer wants, the method of survey will be mainly used for the purpose of efficiently and accurately gathering data and summarizing into useful and meaningful information. The qualified prioritized customer needs are expected to obtain through the analysis of the survey. A customer survey is developed (see appendix I). We made 20 questions in the survey, concerning the background of the customers and their judgments on the service which ICBC provides. The interviewees are customers of ICBC Milan branch. They were asked to do the survey during the waiting time or after the banking service. 53 valid questionnaires were taken back. The results are analyzed as below:

(1) The information concerning the interviewees

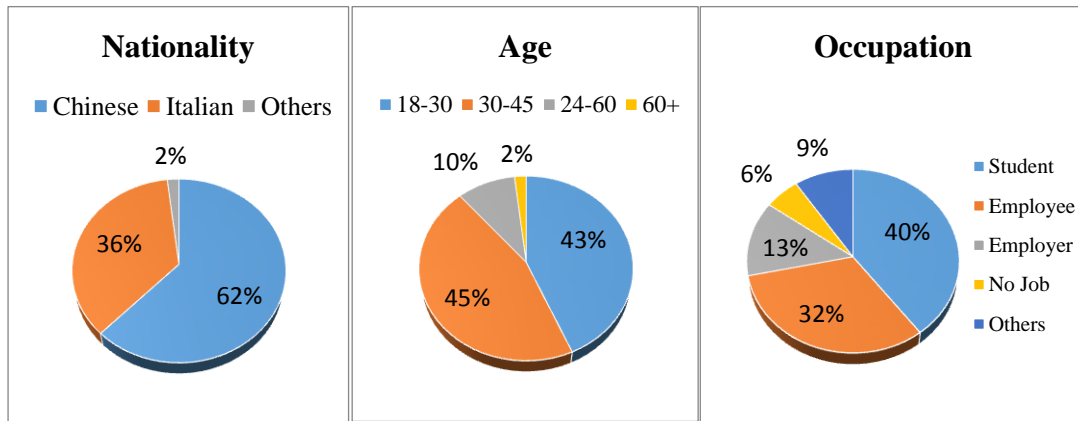


Figure 4.2 Data analysis on the customers' background

The results indicate that although the bank is located in Milan, Italy, the majority of the customers are still Chinese. Especially young and middle-age people less than 45 years old, most of which are students and employees.

(2) About the category of the banking service

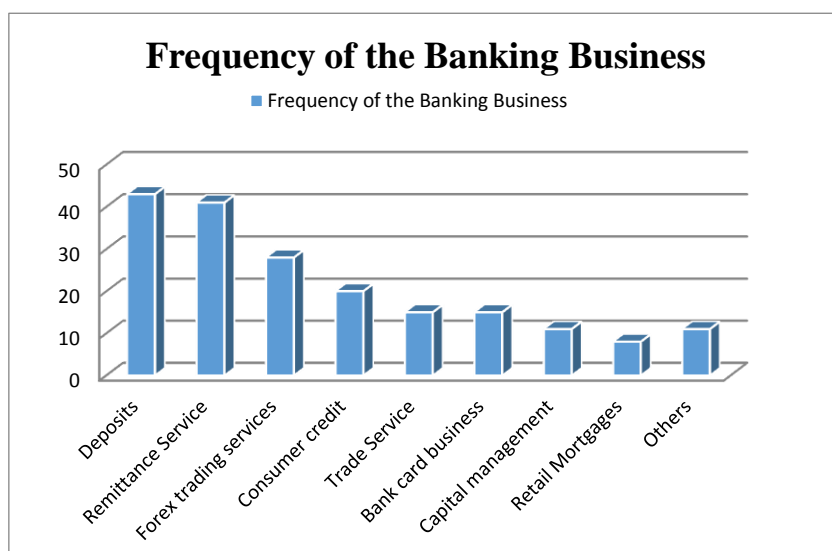


Figure 4.3 The data analysis on the frequency of the banking business

The most frequently used businesses are deposits, remittance service, and forex trading service. We'd better focus on these fields in order to do the improvements efficiently.

(3) The status of self-service businesses

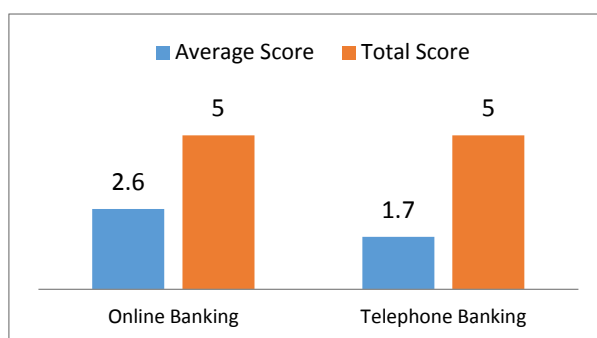


Figure 4.4 Data analysis on the self-service businesses

As it is shown in Figure 4.4, the customers had quite low impression on online banking and telephone banking. More than 90% of the customers have never heard about or never used the telephone banking. More than 50% of the customers have never heard about or never used the online banking, and more than 70% of the remaining customers complained that the online banking is not quite user-friendly. If ICBC can focus on these two self-service businesses, the pressure on the tellers will be remitted a lot.

(4) The importance and satisfaction regarding with the banking service

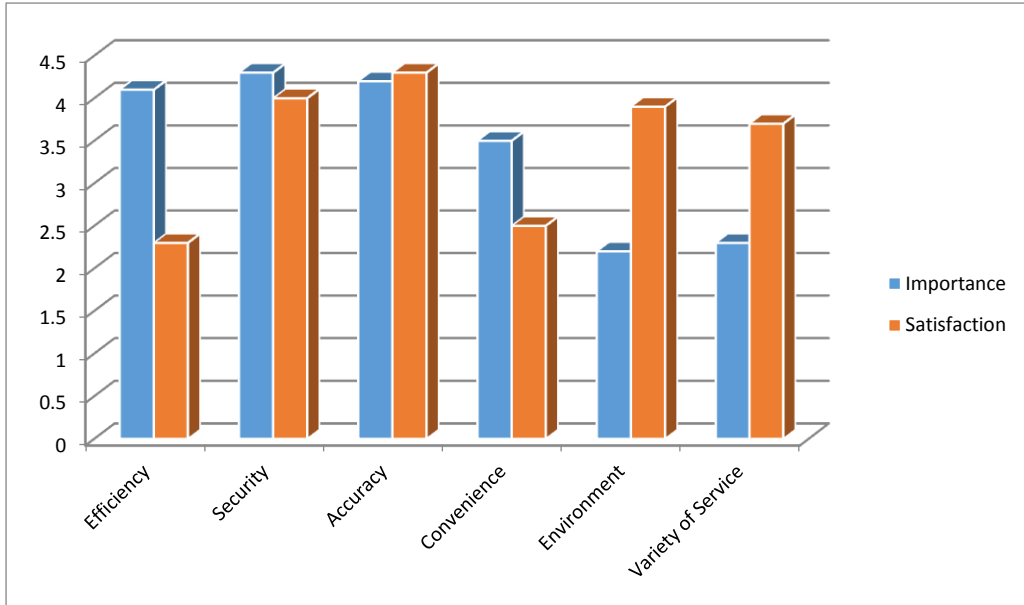


Figure 4.5 The data analysis of importance and satisfaction regarding with the banking service

From the Figure 4.5, we can clear see that the quality of the bank counter services mainly depends on four aspects: efficiency, security, accuracy and convenience, and the services from the point of view of efficiency and convenience have not fulfilled the customers' satisfaction.

(5) Waiting time

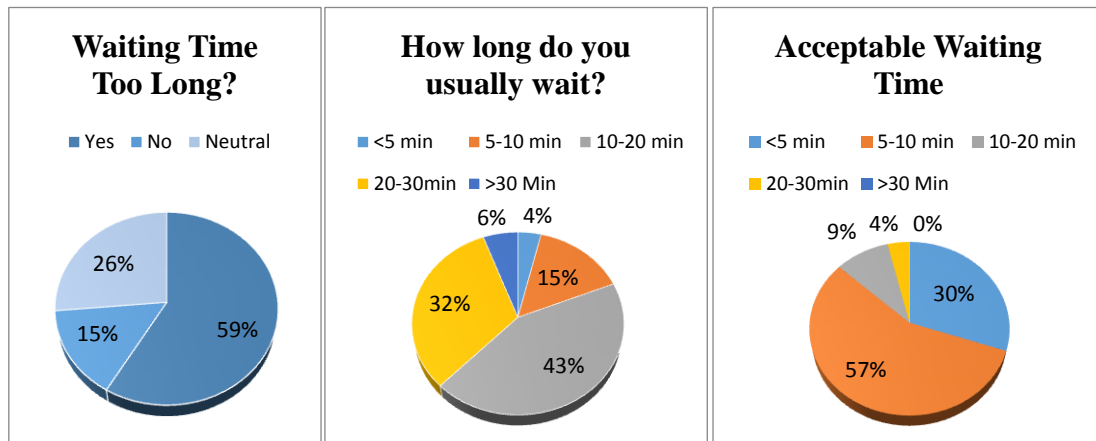


Figure 4.6 The data analysis on the waiting time

Obviously, the customers complained a lot on the waiting time, since only 26% of the customers voted 'no' for the long waiting time. Three fourth of the customers' waiting time is between 10-30 min and more than 87% of the customers claimed that the acceptable waiting

time should be less than 10 minutes.

(6) Interviews with the customers

According to and face to face talk with the interviewees, including both the customers and the tellers, we concluded a couple of problems being mainly mentioned:

- The waiting time is too long. Even it's a simple business, the customer needs to wait for a long time.
- The layout of the business lobby is not rational. There is no staff to guide triage and no place for customers to fill the documentation. All the documents and receipts are obtained from the counter and the customers need to fill them in the counter. These factors greatly affect the business processing speed, at the same time, extend the whole time for business.
- There are too many kinds of application forms for customers to fill. Some operations require some information repeatedly filled in different forms, resulting in customer dissatisfaction.
- The self-service is not complete. The Milan Branch has not introduced an ATM yet. This certainly increases the waiting time and pressure of the counter.
- VIP service is not professional. Since there is no service area for VIP customers, they fell lack of comfort and privacy.
- The FOVA system can't be completely fit with the local environment. In practice, when the business is involved in multiple systems, the teller needs to constantly switch among different systems and enter various transaction code. There are many authorities in the system. Despite the authority of FOVA system, some signatures of managers are also needed. This undoubtedly increase teller transaction time and customer waiting time.

To summarize, we apply six sigma requirements tree to **define** the customer requirements for counter service process, shown as Figure 4.7.

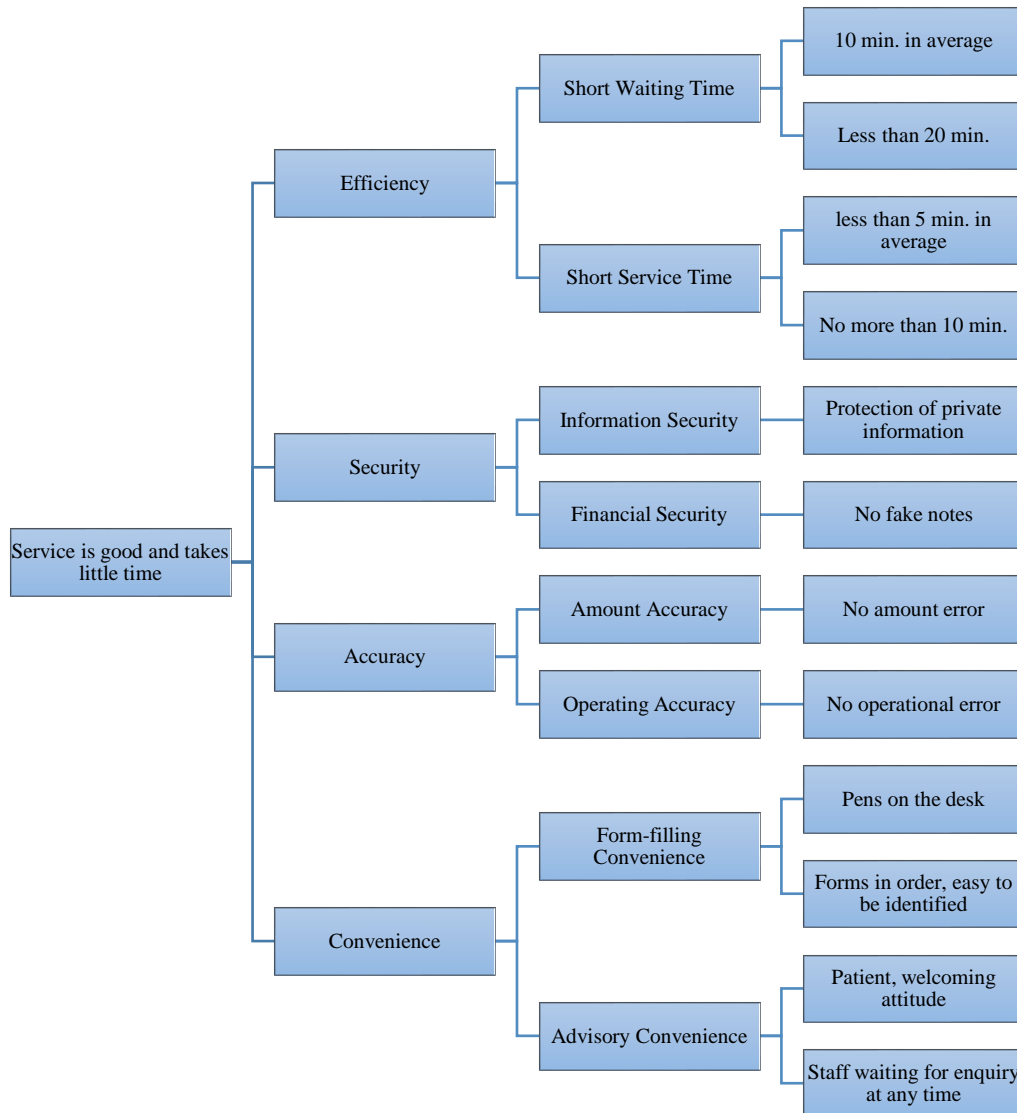


Figure 4.7 Requirements tree of counter service process

The customers' needs can be met from these four aspects: efficiency, security, accuracy and convenience. However, all the needs of customers are not equal. For example, security is far more important than convenience. Therefore, we need to further identify the key elements which determine the quality of the bank counter services.

4.3.1.4 Define the Process of counter service

Process improvement is the essence and starting point of Six Sigma. Precisely defined workflow is the basis for improving the existing level of quality. We observed the business process in the bank hall, in order to have an accurate flow chart from the customer's perspective.

Implementing Six Sigma SIPOC map (S-Suppliers; I-Inputs; P-Process; O-Outputs; C-Customers) shown as Figure 4.8, we define the process of counter service.

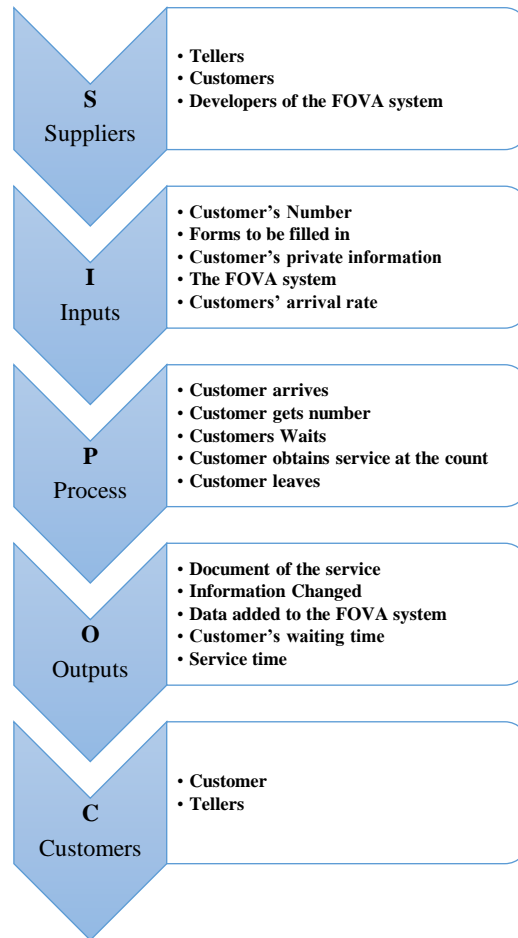


Figure 4.8 SIPOC analysis of counter service process

In the process, customers provide inputs such as private information, while clerks accept the service provided by customers and developers of the FOVA system, therefore customers and clerks have double identity: customers and suppliers, which reflects the particularity of service process.

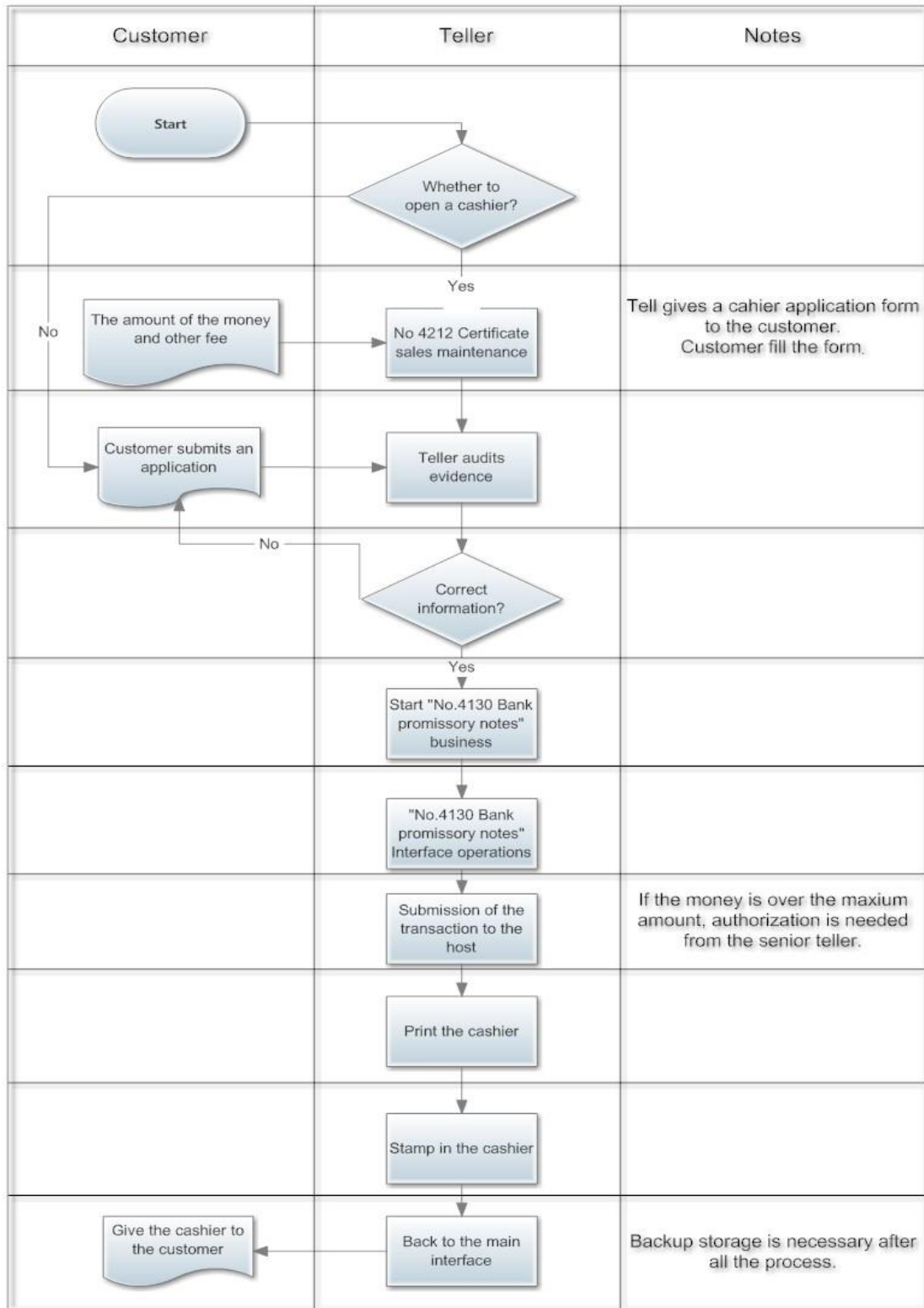


Figure 4.9 Promissory notes flowchart of ICBC Milan Branch

The flow chart accurately reflects the basic operational processes of ICBC Milan branch. An example is shown in Figure 4.9. Through the reference of the customers' needs and the successful experience of other similar banks, we can easily find out the redundant parts and

efficiency bottlenecks.

4.3.1.5 Identify key customer requirements and key process output variables

To meet the key customer requirements will significantly improve the customers' evaluation of the service process. Based on the famous "80/20" rule, 80% of the problems are caused by 20% of errors. As we can see from chart 4.6, the key customer requirements of banking service are efficiency, security, accuracy and convenience. The difference between the importance and current satisfaction of efficiency and convenience are obviously the most significant. Therefore it's better to focus on improving the performance of efficiency and convenience in order to improving the service with the least resource.

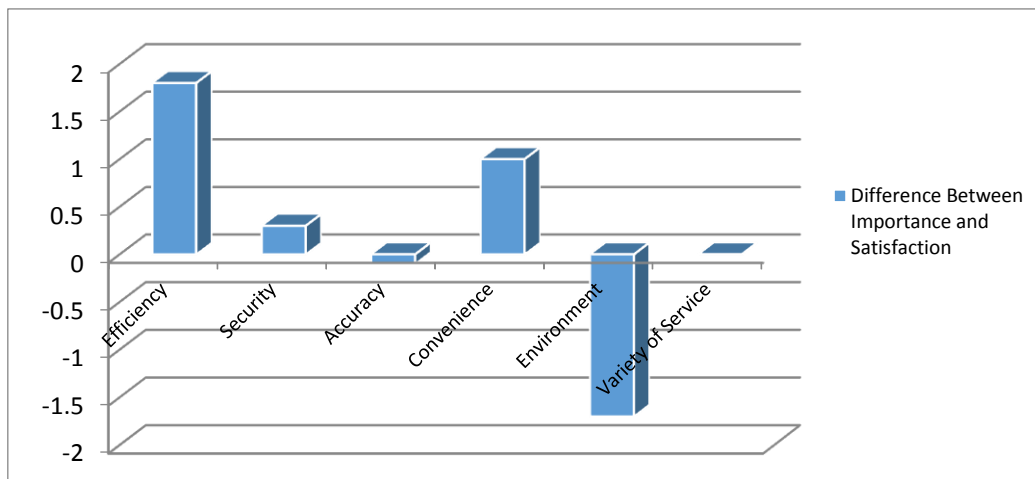


Figure 4.10 The difference between importance and satisfaction of the customers' requirements

From the Chart 4.10, we can see that although there are many factors that affect the customers' satisfaction, efficiency and convenience are the requirements which need to be satisfied. Satisfying Key Customer Requirements will raise the customer's appraisal to the service process highly. During the counter service, every customer requirements maybe different, yet they expect the reduction of waiting time. One research of human behavior indicates that people get impatient waiting more than 10 minutes, get annoyed waiting more than 20 minutes and people usually leave after waiting about 40 minutes.^[xv] It is suggested that bank should control waiting time in 20 minutes, or customer dissatisfaction would grow. Survey to bank service shows that customers of this bank require the average waiting time in 10 minutes, and their tolerance will be 20 minutes. The current waiting time is too long. In other words,

even if the customers' personal needs are different, there is the same hope that the waiting time should be shortened. We determine that Key Customer Requirement should be 'reduction of waiting time', and Key Process Output Variable should be 'customer waiting time'.

4.3.2 Measure

4.3.2.1 Measurement methods

According to the general rules of Six Sigma management and business statistics in common practice, we mainly take Arranging machine statistics, background data extraction, view of the surveillance video and the artificial field measurements as a kind of combination of integrated measurement methods.

4.3.2.2 Measurement content

We designed the measuring job in April and carried it out during the whole May. We've collected 3011 groups of data, 2788 of which are effective, with the effect rate of 92.6%. In order to ensure the data being measured in the same condition, we ignored the data collected in some unexpected situation, e.g. bad weather, holidays etc.

4.3.2.3 Measurement result

We observed that there is a big room for improvement in counter service process, employee morale and customer service, etc.

- 1) Customers wait too long during the transaction of the business. The speed of the transaction is much slow. The quality of attitude and service should be improved.
- 2) There is no staff to do the appropriate arrangement according to the traffic of the customers. There is lack of flexibility. In each business day, the customer flow is not constant during the different time period. This results in the loss of customers.

We obtain the indicators according to the valid samples, measuring the current performance:

- Average waiting time: 16.41 minutes
- Standard deviation of waiting time: 7.70 minutes
- Average invalid number rate: 14.02%
- Average arrival rate: 0.352 customer/ minute
- Average length of the line: 4.48
- Average open window: 2.923

4.3.2.3 Improvement objectives

The indicators above show that waiting time being less than 20 minutes has not been satisfied and the sigma level is only 1σ .

With regard to the key customers' requirements, we would like to ensure the waiting time being less than 20 minutes. Meanwhile, the average waiting time should be less than 10 minutes and the standard deviation be less than 5 minutes for every customer, which can increase the service to 2σ level.

4.3.3 Analysis

In the analysis phase, we will use the fishbone diagram, Pareto diagram, SIPOC diagram and other methods to analyze the problems found in the measure stage. This is the foundation for design solution.

The content of analysis is mainly focused in the following aspects:

4.3.3.1 Problem Identification

In the measurement phase, according to the analysis of the baseline data, we focused our measurement in the number line, customer queuing time and some other data. We concluded the problems into following areas: long waiting time, low efficiency and poor service attitude.

4.3.3.2 Cause analysis

There are many causes of the problems. After the elimination of the interference and systematical collection, we define the main courses into following six factors: staff, system, equipment, environment, process and measurement. We use fishbone diagram to demonstrate

the causal relationship, in order to reflect the reasons intuitively.

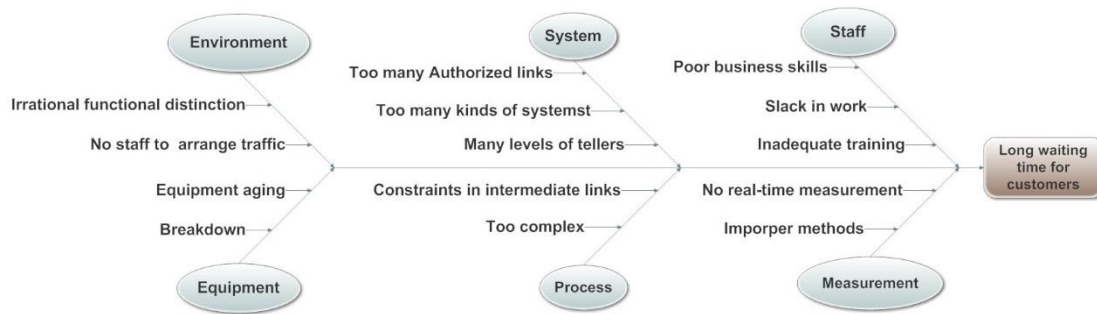


Figure 4.11 ICBC Milan Branch latency reasons fishbone diagram

Meanwhile, we research on the aspects of the invalid number rate, low service efficiency and few respectful to the customers as well.

4.3.3.3 Decide the KPIVs

Though our analysis, there are two main factors which influence most on the waiting time of the customers: the bank-correlated factors and the customer-correlated factors. The bank-correlated factors include service time, number of opening windows, the counter service process etc.. However, the service time is determined by the type and quantitative of service the customers ordered; The number of windows available is saturated; Sets of normative processes have to be followed so as to meet the needs of ICBC system and the local statues. Thus it's better to treat the bank-correlated factors as external factors.^[xvi] In rash hors, the limited resources of the bank could lead to long-time waiting obviously. Consequently, the customers' arrival rate should be regarded as the KPIVs (Key Process Input Variables).

4.3.3.4 Analyze on the statistics data

1) The analysis on the daily arrival rate

For the sake of better understanding the Samples pass the Tests of Normalization and Homogeneity Variance, which are shown in Table 4.1 and Table 4.2. Arrival's percentage in different time period is shown as Figure 4.12. The result of One-Way ANOVA of arrival's percentage in different time period in the day is shown as Table 4.3 and Table 4.4.

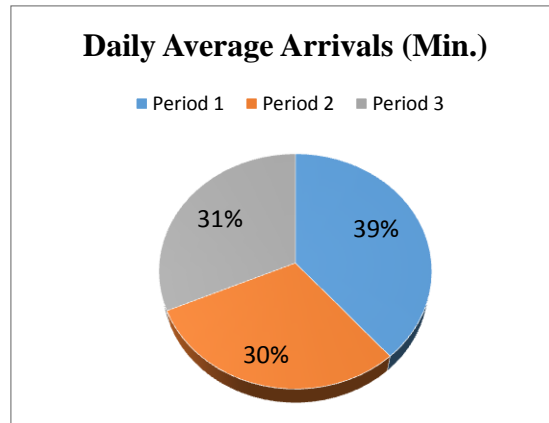


Figure 4.12 Arrivals' percentage in different time periods

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	22	0.38859	0.042893	0.009145	0.36957	0.40761	0.309	0.475
2	22	0.29718	0.028637	0.006105	0.28449	0.30988	0.255	0.377
3	22	0.31436	0.033848	0.007216	0.29936	0.32937	0.253	0.363
Total	66	0.33338	0.05317	0.006545	0.32031	0.34645	0.253	0.475

Table 4.1 Test of Normalization of Variances of the arrival's percentage in different time periods in one day

Levene Statistic	df1	df2	Sig.
3.001	2	63	.057

Table 4.2 Test of Homogeneity of Variances of the arrival's percentage in different time periods in one day

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.104	2	.052	40.932	.000
Within Groups	.080	63	.001		
Total	.184	65			

Table 4.3 One-Way ANOVA of daily arrival's percentage in different time period in one day

Student-Newman-Keuls^a

Period	N	Subset for alpha = 0.07	
		1	2
2	22	.29718	
3	22	.31436	
1	22		.38859
Sig.		.115	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size =22.000.

Table 4.4 S-N-K test of daily arrival's percentage in different time period in one day

We can see that the arrivals' percentage from 9 a.m. to 11 a.m. (Period 1) gets highest among the percentage of 11 a.m. to 13 p.m. (Period 2) and 14 p.m. to 16 p.m. (Period 3). The differences are significant.

2) The analysis on the monthly arrival rate

We analyze the monthly arrival rate according to the valid samples from the same time period in different working days. Samples pass the Tests of Normalization and Homogeneity Variance, which are shown in Table 4.5 and 4.6. The result of One-Way ANOVA of arrival's percentage in different time period in the month is shown as Table 4.7.

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	7	118.14	23.892	9.03	96.05	140.24	90	148
2	7	143.43	11.473	4.336	132.82	154.04	127	157
3	8	119.63	19.405	6.861	103.4	135.85	92	145
Total	22	126.73	21.517	4.587	117.19	136.27	90	157

Table 4.5 Test of Normalization of Variances of the arrival's percentage in different time period in one month

Levene Statistic	df1	df2	Sig.
3.143	2	19	.046

Table 4.6 Test of Homogeneity of Variances of the arrival's percentage in different time periods in one month

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2151.041	2	1075.521	2.983	.076
Within Groups	6850.446	19	360.550		
Total	9001.487	21			

Table 4.7 One-Way ANOVA of daily arrival's percentage in different time period in one month
We can see that the differences of arrival rate from different period in the month aren't significant.

3) Analyze monthly customer waiting time

We use the similar way to analyze KPOV-customer waiting time. Since the samples couldn't pass the Tests of Normalization, which can be seen from Table 4.8, therefore ANOVA can't be implemented in this situation. Thinking of the influences of each month, we use K-Related Samples Nonparametric Test instead, which is shown as Table 4.9, Table 4.10 and Table 4.11. We can see that waiting time in the middle ten days of a month is the longest, in the first ten days is the shortest in Table 4.8. As they are shown in Table 4.11, the difference of waiting time in period a, b is significant and the differences between period c, b and period a, c are significant.

		Period a	Period b	Period c
N		828	1003	958
Normal Parameters ^{a,b}	Mean	18.53	18.95	13.06
	Std. Deviation	8.418	7.665	6.104
Most Extreme Differences	Absolute	.050	.046	.057
	Positive	.025	.027	.037
	Negative	-.050	-.046	-.057
Kolmogorov-Smirnov Z		1.436	1.461	1.750
Asymp. Sig. (2-tailed)		.032	.028	.004

a. Test distribution is Normal.

b. Calculated from data.

Table 4.8 One-Sample Kolmogorov-Smirnov Test of Waiting Time (min.)

N	828
Chi-Square	246.481
df	2
Asymp. Sig.	.000

N	828
Kendall's W ^a	.149
Chi-Square	246.481
df	2
Asymp. Sig.	.000

a. Friedman Test

a. Kendall's Coefficient of Concordance

Table 4.9 K-Related Samples Nonparametric Test of waiting time

		N	Mean Rank	Sum of Ranks
Period b - Period a	Negative Ranks	394 ^a	392.67	154712.00
	Positive Ranks	404 ^b	406.16	164089.00
	Ties	30 ^c		
	Total	828		
Period c - Period b	Negative Ranks	675 ^d	504.54	340567.50
	Positive Ranks	246 ^e	341.52	84013.50
	Ties	37 ^f		
	Total	958		
Period a - Period c	Negative Ranks	230 ^g	305.10	70174.00
	Positive Ranks	573 ^h	440.89	252632.00
	Ties	25 ⁱ		
	Total	828		

a. Period b < Period a; b. Period b > Period a; c. Period b = Period a; d. Period c < Period b; e. Period c > Period b;

f. Period c = Period b; g. Period a < Period c; h. Period a > Period c; i. Period a = Period c

Table 4.10 Wilcoxon Signed Ranks Test of waiting time between different periods

	Period b - Period a	Period c - Period b	Period a - Period c
Z	-.720 ^a	-15.891 ^b	-13.881 ^a
Asymp. Sig. (2-tailed)	.471	.000	.000

a. Based on negative ranks.

b. Based on positive ranks.

c. Wilcoxon Signed Ranks Test

Table 4.11 K-Related Samples Nonparametric Test of waiting time between different periods

4) Modeling

Here y stands for waiting time (minutes); X_1 stands for the number of people waiting in the queue when the customer arrives; X_2 stands for number of opening windows when customer is waiting. We analyzed these three parameter and regressed the relevant mathematical formula.

	Mean	Std. Deviation	N
Waiting Time	16.41	7.703	2398
X1	4.16	1.872	2398
X2	3.05	.820	2398

Table 4.12 Descriptive statistics of the three parameters

		Correlations		
		Waiting Time	X1	X2
Pearson Correlation	Waiting Time	1.000	.942	-.829
	X1	.942	1.000	-.679
	X2	-.829	-.679	1.000
Sig. (1-tailed)	Waiting Time	.	.000	.000
	X1	.000	.	.000
	X2	.000	.000	.
N	Waiting Time	2398	2398	2398
	X1	2398	2398	2398
	X2	2398	2398	2398

Table 4.13 Correlations among the parameters

Variables Entered/Removed^b

Model	Variables Entered	Variables Removed	Method
1	X2, X1 ^a	.	Enter

- a. All requested variables entered
- b. Dependent Variable: Waiting Time

Table 4.14 The variables entered or removed

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.977 ^a	.955	.955	1.641

- a. Predictors: (Constant), X2, X1

Table 4.15 The summary of output of the regression

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	135792.218	2	67896.109	25200.425	.000 ^a
	Residual	6452.716	2395	2.694		
	Total	142244.934	2397			

- a. Predictors: (Constant), X2, X1
- b. Dependent Variable: Waiting Time

Table 4.16 The ANOVA analysis of the regression

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.433	.252		57.167	.000
	X1	2.898	.024	.704	118.732	.000
	X2	-3.298	.056	-.351	-59.209	.000

- a. Dependent Variable: Waiting Time

Table 4.17 The regression of the parameters

After the regression, we can build the mathematic function:

$$Y=14.443+2.898X_1-3.298X_2$$

As we can see from the formula, the coefficient of X_1 is 2.898 which indicates that the length of the queue has a huge influence on the waiting time. As it was mentioned by the banking teller, the clerks are making compromise among the ICBC FOVA system, local regulatory requirements, anti-money laundry pressure, making the system not user-friendly enough. It increased the complexity of the transactions, taking more time for each operation, adding more service time to each customer. That maybe the reason for longer waiting time and high X_1 coefficient.

The number of opening windows has also large impact on the waiting time with the coefficient of 3.298. Since the number of windows has limitations in ICBC Milan branch, it would be difficult to control from this perspective.

5) Identify waste

According to the valid samples, average invalid number rate is 14.02%, which indicates high customer leaving rate. Leaving in advance costs customer time, also makes other customer anticipate longer waiting time and leave early. It causes decrease of income and business amount as well as customer dissatisfaction. The root cause of waste is long customer waiting time. Shown in Table 4.18, the result of Correlation Analysis is that invalid number rate has very strong correlation with waiting time. Thus the key problem the bank should be solved to reduce waiting time.

		Average Waiting Time	Invalid Number Rate
Average Waiting Time	Pearson Correlation	1	.944**
	Sig. (2-tailed)		.000
	N	22	22
Invalid Number Rate	Pearson Correlation	.944**	1
	Sig. (2-tailed)	.000	
	N	22	22

Table 4.18 Correlation between invalid number rate and waiting time

4.3.3.5 Formulate improvement measures

The objectives of all the work in the analysis phase are analyzing and confirming the existing problems, figuring out feasible proposals for improvement and designing the improvement plan. Here is our final plans for ICBC Milan:

- 1) Customer service: adding detailed instructions in lobby, providing with more relevant information for customers avoiding coming in rush hours.
- 2) Counter processes: simplifying the counter service processes, achieving cash and vouchers being separated in the front and back.
- 3) Job position: clearing the clerks' division, dividing the clerks into different positions according to the type and content of business; using the cueing machine to split the stream regarding with the complexity of the transactions.
- 4) Staff spirits: formulating the standards of service and incorporated into the monthly assessment.
- 5) Measurement and evaluation of indicators: establishing measurement and evaluation system, relating the indicators with assessments.

Thus the main task of the analysis phase is to find the principle causes of the problems and confirm them through the Six Sigma and statistical tools. We would like to redesign part of the working processes, develop scientific, reasonable and practicable improving measures.

4.3.4 Improve

Improvement phase is an important part of the branch during the transformation promotion processes, carrying out comprehensive design for various issues mainly through searching for the source of the problem.^[17] Based on our previous interviews with the staff, data collection, investigation and analysis, refining the improvement plan and implementing specific improvements five the five aspects being developed the analysis phase. The following shows 20 detailed improvements which we designed for ICBC:

- 1) Customer Service

Regarding with the mathematic function: $Y=14.443+2.898X_1-3.298X_2$, there are two ways to reduce the waiting time (Y), which are decreasing the length of the queue (X_1) and/or increasing the number of opening window (X_2). Since it would be difficult to increase the number of X_2 , of which the maximum number is four. Therefore we figured out two feasible options to improve the performance from the point of view of customer service, which deliver the main idea of apparent reduction of the fluctuation on the customer arrival by controlling X_1 . If anytime the customers' arrival rate maintains a steady level, the limited facilities will not be the bottleneck of the counter service, leading to the control of the waiting time of the customers as well.^[18]

(1) Show the Arrival Regulation to the public

On one hand, after customers having learnt the regulation of the arrivals, better choices will be available for them to avoid in wasting waiting time. In term of the bank, on the other hand, the clerks will be very glad to see the reduction of the customer flow gap between peaks and troughs. "Filling the gap" leads to a win-win situation. The public can be informed of the "Regulation" through media and many other paths. The screen in the reception hall, a notice on the wall, or any other media can help. The bank should record detailed working data to get other months' or years' regulation. Complete and objective data will benefit the improvements in the future.

(2) Show the arrivals the estimated waiting time

The screen in the reception hall can show the timetable on which the estimated remaining time to wait could be listed. Customers will have a chance to make a judgment whether they can make full use of the "wasting time" to deal with other things. As they know the estimated time, antagonistic sentiments such as complaint will unlikely turn up.^[19] Considering the timetable being estimated, it would be better to leave the upper and lower boundary of confidence interval to provide more accurate information to the customers.

2) Counter Processes:

(1) According to business development needs, setting unified credentials and application forms for the associated businesses, remitting customers' inconvenience to fill a variety of forms.

(2) The head office of ICBC data center needs to enhance the integration efforts to simplify the transacting operations, effectively improving the service efficiency of the counter under the circumstance of preventing risks, local compliance and internal control

(3) Carrying out ATM project, developing applications coincide with local habits.

(4) Enhancing functions and quality of online banking and telephone banking business, reducing effectively the counter pressure.

(5) Carrying out standardized business processes for the tellers during pre-operating, operating and post-operating periods.

(6) Enhancing more efforts on advertising the online banking and telephone banking, for example putting a computer in the lobby with a clear instruction beside for letting the customers experience the online banking. It's better to improve the functionalities and stabilities, especially on the field of deposits, remittance service, and forex trading service, since these are the top three businesses which the customers use most, after which the pressure of the tellers could be remitted.

(7) Setting up self-services such as ATM in the lobby.

3) Job position

(1) Equipping smart matching calling system, guiding customers to different sections by calling machine based on the complexity of the businesses, improving distribution patterns of outlets within the customer flow and business flow.

(2) Optimizing the labor force. The mathematic function $Y=14.443+2.898X_1-3.298X_2$ can help them to improve the internal efficiency. We can easily figure out that $X_2=(Y-14.443-2.898X_1)/3.298$, with which the bank can decide the number of opening windows as well in order to optimize the distribution of the labor force by setting up the corresponding flexible working schedule for the clerk with regard to the number of customer flow.

(3) Clarifying the job division of the tellers, distinguishing between simple and complex businesses, facilitating the banking management and the customers' identification by guiding them to different sections.

(4) Setting up form-filling table, reducing the waiting time of the tellers, make tellers conduct

the transactions more rapidly and more efficiently.

(5) Establishing the banking center, within which setting up cash counter, providing one-stop service, giving the feeling distinguished for the high-end customers.

4) Staff Spirits:

(1) Formulating related services standards, carrying out staff training regularly and checking the feedback of the training effect;

(2) Introducing scoring machine at the counter. After each service for the customers, the tellers ask them to grade a score from 0 to 10 points. It could be included into the individual assessments.

(3) Giving both material and spiritual forms of awards to employees with outstanding performance, setting up examples by publishing the outstanding employees on the bulletin board in the bank.

5) Measurement and evaluation of the indicators

(1) Building measurement and evaluation system of customer waiting time, customer satisfaction and other key indicators.

(2) Analyzing on the measurement data regularly and showing the measurement results through forms, charts and other statistical tools.

(3) Relating appropriately the measurement results with the individual assessment.

In a word, improvement phase, which is demonstrated phase of project results, is to refine and implement the improving measures given in the analysis phase. We transformed the existing problems through six aspects, which are customer service, count process, job position, staff spirits and measurement and evaluation of the indicators.

4.3.5 Control

Control is the last step of DMAIC, which will consolidate the achievement and maintain the improvement so as not to see the problem again. The improvement scheme of the bank

counter service still needs Control to check the affect and restrict the mistakes.^[20]

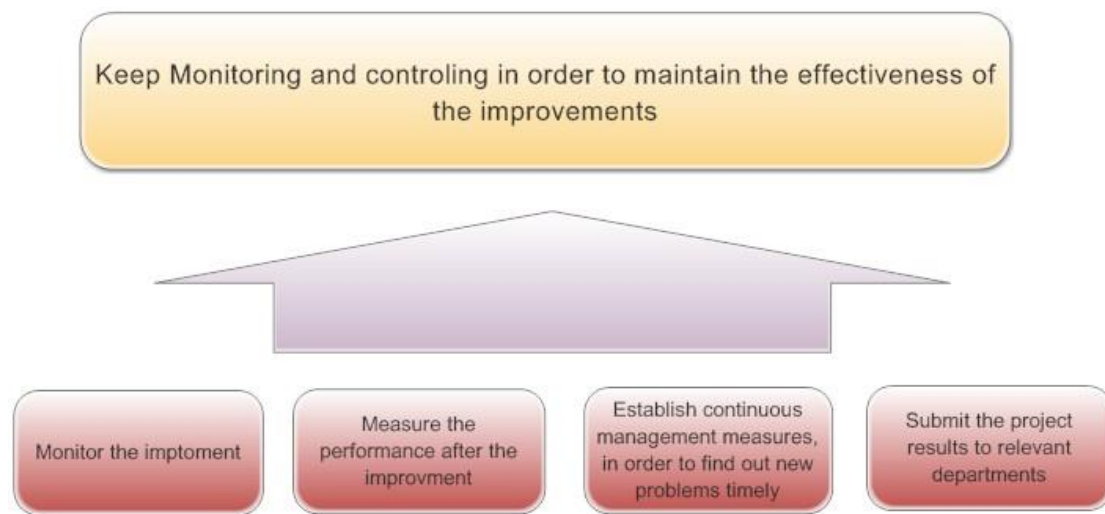


Figure 4.13 Ideas and the main content of control phase in ICBC Milan branch

The main ideas and content in the control phase is the last important focus of the project in the final stage.

A. Strengthen monitoring and training; Consolidate the achievements transformed

(1) It's necessary to establish a file to record the performances. By using the customer queuing system, the banks can record the customer waiting time, customer satisfaction and other key indicators quarterly.

(2) Prepare a short video as a teaching material to show the project.

2) Establish feedback system to continually optimize the services

(1) Organize special investigation and guidance of the branch transformation. Establish the research of branch assessment, risk control, customer waiting time and service monitoring system.

(2) Analyze the results of the research, listen to the customers and continuously improve services.

3) Create the corporate culture for continuous improvement

(1) Implement different measures to cultivate the sense of improvement of the staff

During the control phase, the implementation of the program is mainly on the effect of improving the dynamic monitoring and control, which are both considered as the verification

and validation of project results, but also a process of continuous improvement. With the correction by controlling stage effects of the problems to improve the recognition, the bank can show the project implementation of the transformation goals.

5 Conclusion

5.1 Managerial Implications

As you can see from the fourth chapter, we mainly implemented DMAIC in this project. During each phase we applied a lot of tools which helped us a lot in executing the project.

1) Define process:

Define the Problem or Project Goals that needs to be addressed.

We interviewed with the teller and the head of banking department of ICBC Milan branch, trying to figure out the features of our daily business internally. Then we implement questionnaire and interviews with the customers for listening to VOC, being familiar with customer features and their requirements, which was summarized by requirement tree. SIPOC was used for defining the process of counter service. Process modeling was being implemented for identifying the processes.

2) Measure process:

Measure the problems and processes from which they were produced.

We decided the data we needed and measured them and figured out the improvement objective.

3) Analysis process:

Analyze data & process to determine root causes of defects and opportunities.

Fishbone diagram was used to analyze the causes for the latency problem. We found out the KPIVs (Key Process Input Variables) which interfere the process most. Then we analyzed the data having been collected in the measure process. And formulating the improvement measures.

4) Improvement Process:

Improve the process by finding solutions to fix, diminish, and prevent future problems.

We generated 20 detailed point to be improved.

5) Control Process:

Implement, Control, and Sustain the improvements solutions to keep the process on the new course.

We setup rules for controlling the performance and realize continuous improvement.

5.2 Value of the Thesis

1) Presenting the connotation of Six Sigma in depth.

Six Sigma is not only a nearly perfect statistic standard in the level of quality, but a comprehensive management pattern.

2) Summarizing the detailed fields of the implementation of Six Sigma in commercial banks.

Six Sigma is more applicable to the processes which are highly repeatable, relatively easy to measure, and preferable simple.

3) Analyzing the DMAIC methodology in ICBC Milan case

Especially in the counter services, which give a better sense of how commercial bank use Six Sigma.

5.3 Limitations of the Work

Even we had made a great achievement during the research, we still realized that there are some problems and limitations which can't be solved due to the limited time and efforts.

1) Limitation of process

In our research, we put most of the emphasis on the counter service quality, while there are still many other processes that also can be improved by Six Sigma. For example, the background system is also a significant part since it has a big proportion in the whole process. Due to the apprehension about security and technique, we were not able to access to the detail of the background system. If the process time of the background system can be improved according to Six Sigma, the whole process would be much more efficient.

2) Limitation of banks

Another limitation is that we only focused our research on one Chinese commercial bank branch, ICBC Milano branch, while there are many overseas branches of Chinese commercial banks all over the world. Every bank has its own process and own standard, and the service quality of each bank is quite different. It's possible that some of them have made great progress in counter service quality or other aspects. If we had the chance to apply Six Sigma in more than one bank, we could collect more data and do more analysis. The result could be

more practical and objective.

3) Limitation of fields

Despite the two points mentioned above, the application field of Six Sigma can be extended to other fields more than commercial banks. The core of Six Sigma is customer-oriented management and process improvement. The two key features are also the basis of some other commercial institutions such as securities companies, finance companies and financial leasing companies. These institutions can create a wide space for extending the application of Six Sigma.

5.4 Future Development

Due to the limitations listed above, our research needs future development in order to make the application of Six Sigma more practical and mature. For the constraints of caliber and schedule, the following suggestion leave to be realized in the future:

1) Expanding research into the whole process

In our future studies, we can extend our work from the counter service into other processes, especially in background systems. That will help us to have a deeper view of the whole process, and to find out the different key points of Six Sigma in different processes. We can analyze the coordination of Six Sigma application in different departments, in order to verify the improvement and its feasibility.

2) Expanding research in other banks

Since the process and environment of ICBC Milano branch is fixed, the data of the research is also limited. Six Sigma application in a single bank may inevitably have constraints and limitations. By expanding our research in other banks, we can find the potential improvement capability of Six Sigma as well as verify the result of the research done before.

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Appendix

SURVEY ON BANKING SERVICE OF ICBC

Dear customers:

We are doing a survey regarding with the banking service of ICBC with the aim of improving our current service. We assure you the protection on your privacy. Thanks for your support.

1. Your nationality:

A. Chinese B. Italian C. Others_____

2. Your age:

A. 18-30 B. 31-45 C. 45-60 D. 60+

3. Your occupation

A. Student B. Employee C. Employer D. No Job E. Others_____

4. Which kinds of service do you usually take in the bank? (Please Rank according to the frequency)

A. Deposits B. Remittance Service C. Consumer credit
D. Trade Service E. Capital management F. Forex trading services
G. Bank card business H. Retail Mortgages I. Others_____

5. What do you think about the listed service we provide?

Description	Very useful	quite useful	Neutral	quite useless	never used
Online banking	5	4	3	2	1
Telephone banking	5	4	3	2	1

6. What do you think about the weaknesses of our online banking?

A. Not Safe B. Limited range of service C. Not user-friendly
D. Never heard about it E. Know it but never tried F. Others_____

7. What do you think about the weaknesses of our telephone banking?

A. Not Safe B. Limited range of service C. Not user-friendly
D. Never heard about it E. Know it but never tried F. Others_____

8. Generally Speaking, regarding the banking service, how much do you emphasize on? (Mark on the relevant grade)

Descriptions	Very Important	Quite Important	Neutral	Less Important	Not Important
Efficiency	5	4	3	2	1
Security	5	4	3	2	1
Accuracy	5	4	3	2	1
Convenience	5	4	3	2	1
Environment	5	4	3	2	1
Variety of service	5	4	3	2	1

9. Could you grade our service according to your satisfaction? (Mark on the relevant number)

Descriptions	Very Satisfied	Quite Satisfied	Neutral	Less Satisfied	Not Satisfied
Efficiency	5	4	3	2	1
Security	5	4	3	2	1
Accuracy	5	4	3	2	1
Convenience	5	4	3	2	1
Environment	5	4	3	2	1

Variety of service 5 4 3 2 1

10. In terms of "Efficiency", which aspects do you care most? (Choose no more than two options)

- A. Short waiting time B. Short service time
 C. High advisory efficiency D. Clear process indications E. Don't care

11. In terms of "Security", which aspects do you care most? (Choose no more than two options)

- A. Protection on private information B. Privacy during the service procedure
 C. Finance security, no fake notes D. Real-time patrol by the securities E. Don't care

12. In terms of "Accuracy", which aspects do you care most? (Choose no more than two options)

- A. Amount Accuracy, no error B. Accuracy on the indicators of operational process
 C. High advisory accuracy D. Content accuracy on the advisories E. Don't care

13. In terms of "Convenience", which aspects do you care most? (Choose no more than two options)

- A. Easy form filling B. User-friendly queue management system
 C. Convenient in advisory D. Clear procedures, not complicated E. Don't care

14. In terms of "Environment", which aspects do you care most? (Choose no more than two options)

- A. Clean surroundings B. Harmonious environment with plant and flowers
 C. Uniformed employees D. Bright Lights E. Don't care

15. In terms of "Variety of service", which aspects do you care most? (Choose no more than two options)

- A. The quantity of service B. Better quality and substantial
 C. More Customized service D. Adequate publicity and instructions E. Don't care

16. Which one of most necessity to be added in our branch?

- A. ATM machine B. Local credit card C. Bill payment services D. Others_____

17. Do you think the waiting time in our bank is seriously long?

- A. Yes B. No C. Neutral

18. How long does it usually take on waiting for the service?

- A. Less than 5 min B. 5-10 min C. 10-20 min D. 20-30min E. More than 30 Min

19. What's your acceptable waiting time?

- A. Less than 5 min B. 5-10 min C. 10-20 min D. 20-30min E. More than 30 Min

20. What do you think about the reason for long waiting time? (Multiple)

- A. Too many invalid numbers during the queue B. Weak awareness of service of the staff
 C. Low usage of online service D. No sufficient guidance and instructions
 E. Unreasonable distribution among windows F. Limited number of windows