

CityUniversity
of Seattle

***Project Quality Management Application in the
Financial Service Industry***

By

Konstantinos St.Kousouris

A THESIS REPORT
Presented to the Project Management Program in the
School of Management of
City University of Seattle
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE in PROJECT MANAGEMENT

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This Master Thesis was elaborated in the frame of the collaboration of the City University of Seattle and the Graduate Technological Education Institute (T.E.I) of Piraeus to fully implement at TEI of Piraeus Campus the CU's MS in Project Management Program approved by the Hellenic Ministry of National Education and Religion Affairs as by decision E5/58291 published in the Hellenic Government Gazette (FEK) B/924/5-July-2005.

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This Master's Thesis is dedicated to my grandparents for sharing with me their lifes' experiences and especially my grandfather Konstantinos Sp.Kousouris who after his death still remains my guardian angel.

Athens

June 2009

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Athens, June 2009

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BIOGRAPHY

Konstantinos St.Kousouris

Konstantinos St.Kousouris completed his studies in the department of Business Administration of the Faculty of Technological Institute of Pireaus in October 2005 and he is a qualified manager.

During his studies he worked as a manager in companies related with services and product sales.

Currently he is working at Citibank member of Citigroup International PLC, one of the leaders in the financial industry. As an assistant manager of the back office acquisition unit of credit cards is responsible to maintain the acquisition process flow of credit cards and contributes this way to customer's satisfaction. The position includes a variety of leadership, management, communication skills, challenges and opportunities.

Finally, in pararell with his job, the author is enrolled at City University of Seattle as a post-graduate student in the Master of Science in Project Management Program.

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ABSTRACT

Konstantinos St.Kousouris

Project Quality Management Application in the Financial Industry

Since project management is the new wave of the future in global business the projects are closely related with customers. Customers are part of the project and it seems that projects are becoming customer driven in order to achieve customer satisfaction. While the wide debate continues on the role and function of the customer in project quality management there will be no such debate in the future as the customer becomes a full partner and member of the project team. Project management literature is focused on business community and how practices and tools can be used with success. Therefore this study has a core these practices of project quality management and how can be applied in sectors like financial services industry where the customer is a core of each kind of project.

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1. Introduction

1.1 Nature of the study

Project management is the new wave of the future in global business and projects are closely related with customers. Customers are part of the project and it seems that projects are becoming customer driven for achieving customer satisfaction. While the wide debate continues on the role and function of the customer in project quality management there will be no such debate in the future as the customer becomes a full partner and member of the project team. Project management literature is focused on business community and how practices and tools can be used with success. Therefore this study is related with project quality management and how can be applied in sectors like financial services industry where the customer is a core of each kind of project.

1.2 Needs assessment

Quality processes that already used in financial institutions provide information and feedback regarding quality management and how this management concept is adapted from both employees and customers.

1.3 Purpose of study

It is expected that research on the data collection techniques, practices and tools that used in the financial services industry will reveal new approaches how a customer can be delighted and how these techniques can continuously be improved. The core of quality is the continuous improvement and that principle is adapted from the customer driven projects of the financial services industry.

1.4 Significance to workplace

Every financial institution ought to have a quality policy that is to be followed in order to provide quality services to its clients. Organizations every day are dealing with problems such as the lack of communication in the middle management levels, quality policies are not defined, and employees are unable to understand customer needs. These factors considered as obstacles, in delivering high quality services to clients and thus clients remain unsatisfied. The real time problems that occur on a daily basis in the workplace require assistance to present solutions and recommendations for improvement.

1.5 Relation to the program of study

The PM511 course (Project Quality Management) is the main course that is related to the thesis. Quality management, quality concepts and maturity models are keys to understanding and managing quality projects and producing quality projects outcomes. The financial services industry ought to follow quality processes in order to satisfy customers. Since Project Management and Quality Management are similar managerial concepts this approach could be important to the service industry field. The PM512 course (The Customer in the Project Process) emphasizes creating and sustaining a client focus including techniques for promoting and maintaining client participation. In a customer driven project quality maintains the stability among the project's stakeholders.

2. Problem Statement

2.1 Rationale

Projects and Project Management are the wave of the future in global business. Customers buy based on their perception of product and service quality. Quality defines profits and each customer defines and determines the quality of the product or the service that needs. High quality in services generates sales which are relevant to profit.

The success of Total Quality Management established in the manufacturing sector started to influence other sectors of production such as services. Most bankers believe that banks are in the finance industry and not in the service industry. They tend to compete in terms of financial prowess rather than service quality. Resources, time systems and people are focused more on managing assets and cash rather than on managing customers and services. The lifeblood of any business is its customers. The rapid competitive market and the increasing human needs have caused organizations to examine approaches that enable them to survive.

The integration of the quality movement and project management comes in the form of project quality management. Quality is defined and measured by a strong system of processes that tend to satisfy customer.

Over the years the bureaucracy and the complexity of the banking system has emphasized control and sacrificed customer services. Total Quality Management which is focused totally on customer service and continuous customer satisfaction is applicable not only in manufacturing industry but in services as well. Customers in the service industry are connected with service quality because they are always in contact with the front line personnel.

2.2 Hypothesis-Objective

The objective of this thesis is to show that in a very rapid financial market applying Project Quality Management techniques in financial services customers can be delighted.

3. Review of Literature

3.1 Overview

The literature review includes a variety of resources related with the topic. Books, journals, articles and web research is used in order to define the financial service industry, the banking system and how quality systems in financial sector integrate customer satisfaction. Furthermore theories regarding total quality management and project quality management presented and identify the relationship between quality and customer's needs.

Quality manuals, processes as parts of quality management plans from financial leaders, provide important information about the topic. The literature review presents and informs readers about how quality as a philosophy is used in the financial area, how could assist in improving customer's satisfaction and allows to author of this paper to propose innovating ideas.

3.2 Financial Service Industry

The finance industry includes a range of organizations engaged to create and deliver financial services. Commercial banks, credit card firms, insurance companies, saving and loan institutions, brokerage firms, investment companies stock brokerages are part of the financial sector.

Before the crisis of September 2008 the financial services industry represented a great average of the markets capitalization. Statistical researches showed that financial services represent the 75% of the GDP in the majority of the developed countries.

It is referred as an example the study that took place during 2006 from Business Week and Interbrand to provide an image of the best global brands-financial services institutions and their ranking regarding previous years:

Rank	Brand	Brand value (US\$billion)	Annual change	2005 Rank	2004 Rank	Country of origin
11	Citigroup	21.46	7%	12	10	U.S.
14	American Express	19.64	6%	14	13	U.S.
21	Merrill Lynch	13.00	8%	25	22	U.S.
28	HSBC	11.62	11%	29	27	U.K.
33	J.P. Morgan	10.21	8%	34	32	U.S.
36	Morgan Stanley	9.76	0%	33	35	U.S.
37	Goldman Sachs	9.64	13%	37	37	U.S.
42	UBS	8.73	15%	44	44	Switzerland
87	ING	3.47	9%	87	87	Netherlands

Table 1: Best global brands-financial services institutions

Similar to the above study is the study that Global Investor took during 2005 and presents the top 10 investment managers by assets under management:

Rank	Company	Assets under management (US\$million)	Country
1.	<i>Barclays Global Investors</i>	1,400,491	UK
2.	<i>State Street Global Advisors</i>	1,367,269	US
3.	<i>Fidelity Investments</i>	1,299,400	US
4.	<i>Capital Group Companies</i>	1,050,435	US
5.	<i>The Vanguard Group</i>	852,000	US
6.	<i>Allianz Global Investors</i>	790,513	Germany
7.	<i>JPMorgan Asset Management</i>	782,646	US
8.	<i>Mellon Financial Corporation</i>	738,294	US
9.	<i>Deutsche Bank Asset Management</i>	723,366	Germany
10.	<i>Northern Trust Global Investments</i>	589,800	US

Table 2: Global investment and assets managers

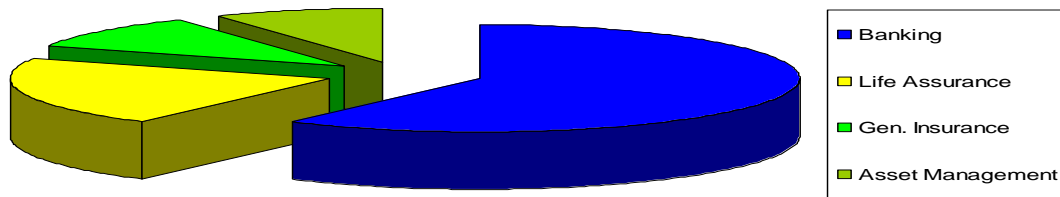


Figure 1: Distributions of Financial Service Industry activities

The Financial Service Industry seems to be one of the fastest growing parts of world economy. As it presented on figure 1 there are four main areas of this sector, banking, life insurance, general insurance and asset management.

Retail banking, securities brokerage, and credit cards as primary divisions of the Financial Service Industry seem to be in a close connection with quality issues by providing direct benefits to customers through the services that offer. Service quality is taken under serious considerations since from customer's satisfaction depends the market share of the financial organizations and their profit too. Profit is vital for maintainance in the market so quality issues are on dialy debates in the higher management of every financial organization.

While the worldwide economy collapse the financial industry seeks new ways or improves old processes to regain customer's loyalty. Financial's industry performance is linked with the world wide economic growth. Financial innovations will provide solutions for making again this sector active. It is

important to establish and improve quality metrics in this vital sector of economy.

3.2.1 Banking System

The banking system is characterized from numerous transactions regarding individuals, their accounts and the cash flow. These transactions in order to be effective follow processes and use technology appropriate to provide the best outcomes to customers-shareholders. Loans, credit cards, insurance products are some of the services that banking system offers to its clientele.

Worldwide the retail banking takes more attraction than every other function of the banking system. The front line, the branches or the financial institutions's representatives pointed as the most vital and important for every financial organization since there is a direct and on going relationship with customers. Higher management sets goals and targets that must be achieved in order to maintain the market share. These decisions are understandable because the customer comes first and that generates revenue, vital for every organization's maintenance. But in order the front line to be effective, work properly and provide positive results a back office system is developed that is able to acquire all the transactions.

After researches that took place in the financial industry it is presented the fact that most of financial institutions back offices cost approximately 30-40% of the revenues in infrastructure and on fixing errors of the front line. These researches showed that many back office processes are not customer centric and therefore customer satisfaction is not achieved. Operational risks,

high transaction cost and bad customer services are some of the final results from researches. These results seem logical since the back office units are invisible to the customer, there is no direct interaction with them and the daily back office work sometimes tends to be a routine.

Credit card is the most common and popular product-service that the financial industry provides to the market. It is the most profitable because of the higher margins offer better assets than commercial lending and the most popular because of the faster adoption from consumers-people who spend money. A credit card provides the illusion of lifestyle and high status to the card holder.

The credit card business is a complex undertaking because it is close related with the customer satisfaction. Customer's expectation about this specific product-service is not often achieved because of the malfunction in the back office processes of financial organizations.

From the early 90's Financial Service Sector started to realize that problems occurred in the back offices and tried to establish quality measures in order to eliminate or minimize bad effects on the final back office processes outcomes. Focusing on back office improvement by applying quality management systems was the first step and the results showed up after a decade. An example is the AT+T Calling Card which linked with a consumer credit card. This product philosophy based on a well organized back and front line office that was and is focused on customers. The vision of the best customer services relationship gave value to the credit card industry and financial institutions started to change the back office processes in order to

minimize or eliminate errors in processes that already existed, setting as primary goal customer satisfaction.

3.3 Quality

Through the years many definitions about quality were developed. According to author quality is customer's perception about a product or service. The level this perception is satisfied is equal with the meaning of quality. Its individual has different standards about quality so an accurate definition of quality depends always with that is in every individual's perception.

Scientists, researchers over time gave various interpretations regarding quality. Philip B. Crosby in the 1980s defined quality as the '*conformance to requirements*'. According to W. Edwards Deming quality is in a close connection with cost reduction. As he noticed '*costs go down and productivity goes up, as improvement of quality is accomplished by the better management of design, engineering testing and improvement process*' (1988). He continues with the statement '*better quality at lower price has a change to capture a market, cutting costs without improvement of quality is futile*'.

Noriaki Kano in early 1980's expressed a 'two-dimensional model of quality'. According to his theory quality has two dimensions the first is the "*must-be quality*" and the second is the "*attractive quality*". The first dimension came close to Joseph M. Juran's '*fitness for use*'. The second dimension focused on what the customer would love, or prefer. This theory

established the following statement: *'products and services ought to meet customer's expectations'*.

Genichi Taguchi belief regarding quality was based on an accurate view of the production system. According to his definition quality is the *'loss a product imposes on society after it is shipped'*. His theory presented three basic concepts of quality:

- ❖ *'Quality should be designed into the product and not inspected into it.'*
- ❖ *'Quality is best achieved by minimizing the deviation from a target. The product should be so designed that it is immune to uncontrollable environment factors.'*
- ❖ *The cost of quality should be measured as a function of deviation from the standard and the losses should be measured system-wide.'*

Joseph M. Juran's thoughts characterized quality as a *'fitness for use'* when fitness is defined by the customer. Joseph M. Juran on his *'Quality Handbook'* (1999) considered as important two meanings of quality:

- ❖ *'Quality means those features of products which meet customer needs and provide customer satisfaction.'*
- ❖ *'Quality means freedom from deficiencies'*.

American Society for Quality sets two important meanings about quality:

- ❖ *'The characteristics of a product or service that bear on its ability to satisfy stated or implied needs'*.
- ❖ *'A product or service free of deficiencies'*.

The quality concept requires to observe the final outcome, which could be a product or a service, from the customer's perspective. In other words the processes must be determined from the outside-in. By this way the organization can understand better the customer's needs what customer feels about a product or service and what expects the final outcome could be. Quality can not be defined unless there is any relation with a function or object. It is a subjective attribute and depends on customer's perception and expectation.

In order the quality of a product or service be measured or be improved many different techniques and tools and processes were developed and are still developing to achieve customer's satisfaction. Few of techniques and processes are:

- ❖ Statistical Process Control (SPC).
- ❖ Zero Defects.
- ❖ Six Sigma.
- ❖ Quality Cycles.
- ❖ Quality Management Systems (ISO 9000).
- ❖ Theory of Constraints (TOC).
- ❖ Malcom Baldrige National Quality Award.
- ❖ Design of Experiments (DoE – Taguchi's L9, L12 experiments).
- ❖ Fishbone Diagram – Ishikawa.

The above tools techniques and processes were established with success in the heavy industry in the past years providing the best outcomes to customers and satisfying their needs. The challenge of the 21 century is how

these techniques can pioneer to more sectors, to more industries such as the health care and financial. Services seems to be now days one of the core needs of individuals. The high quality services is the new challenge for industry and from the early 90's theories from Quality Gurus started to involved in the service sectors. After the financial crisis of September 2008 the quality principles are tend to be more important than ever in order to be gain again trust between customers and financial organizations .

3.3.1 Definition of Total Quality Management

Total Quality Management (TQM), a buzzword phrase of the 1980's has been killed and resurrected on a number of occasions. The concept and principles are back into existence through the evolution of the Management Quality System standards.

The technological evolution of the past two decades led many organizations to change their strategy and create products and services according to the customer needs and perceptions. This technological challenge increased the global emphasis on quality management and its divisions. Quality on products and services became the most important success factor. The competitive market forced many organizations to adapt quality principles and offer to customer products and services with high quality standards. Joseph M. Juran noted that '*the twentieth century was the century of productivity the twenty-first century will be the quality century*'.

The Total Quality Management (TQM) targets the lower cost, the higher revenues, the delighted customers and the empowered employees (Juran's

Handbook 1999). The figure 2 presents the pyramid of these basic elements of Total Quality Management (TQM).

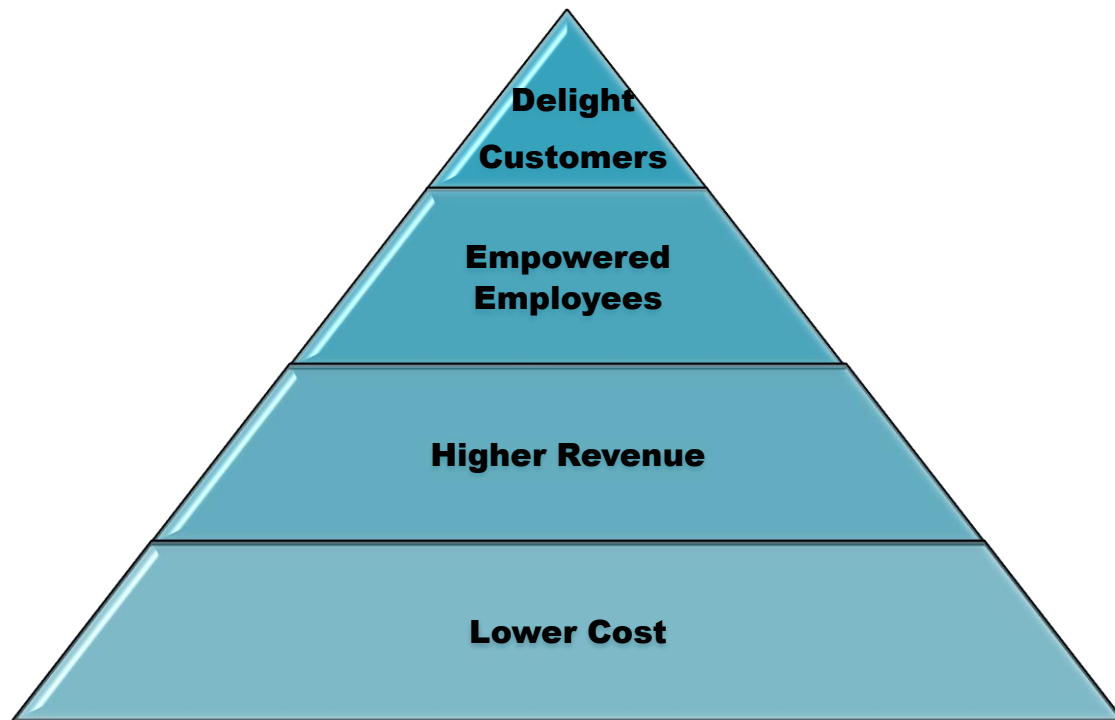


Figure 2: Results of total quality management (leadership for the quality century 1997 Juran institute)

According to Joseph M.Juran (1964) the Total Quality Infrastructure included the following elements:

- ❖ The quality system.
- ❖ The customer –supplier partnerships.
- ❖ The total organization involvement.
- ❖ The measurement and information policies.
- ❖ Education and training programs.

Feigenbaum (1951, 1956 & 1961) named Total Quality Control, as a division of Total Quality Management, as an effective system that intergrates quality development quality maintenance and quality improvement efforts of organizations in order to provide products and service with low cost and high customer satisfaction. Ishikawa (1981) stated that total quality management 'consisted of developing, designing, producing, marketing and servicing products and services with the minimum cost and the highest customer satisfaction. According to Martin (1993) the principles of Total Quality Management can be divided as followed:

❖ Management Commitment:

1. Plan (drive, direct).
2. Do (deploy, support, and participate).
3. Check (review).
4. Act (recognizes, communicate, revise).

❖ Employee Empowerment:

1. Training.
2. Suggestion scheme.
3. Measurement and recognition.
4. Excellence teams.

❖ Fact Based Decision Making:

1. SPC (statistical process control).
2. DOE, FMEA.
3. The 7 statistical tools.
4. TOPS (FORD 8D - Team Oriented Problem Solving).

- ❖ Continuous Improvement:
 1. Systematic measurement and focus on CONQ.
 2. Excellence teams.
 3. Cross-functional process management.
 4. Attain, maintain, and improve standards.
- ❖ Customer Focus :
 1. Supplier partnership.
 2. Service relationship with internal customers.
 3. Never compromise quality.
 4. Customer driven standards.

Cole and Mogab (1999) added the statement that Total Quality Management as a structure system must satisfy both internal and external customers of an organization. Barkley and Saylor (2001) characterized Total Quality Management as a recent management concept that evolves a wide range of management practices, productivity enhancements and improvement efforts. Furthermore Total refers to everyone who is involved and in all activities of the organization. Quality meets customer requirements.

Management indicates that quality can and must be managed. Barkely and Saylor (2001) determined the Total Quality Management process as a series of activities that include inputs, processes and outputs.

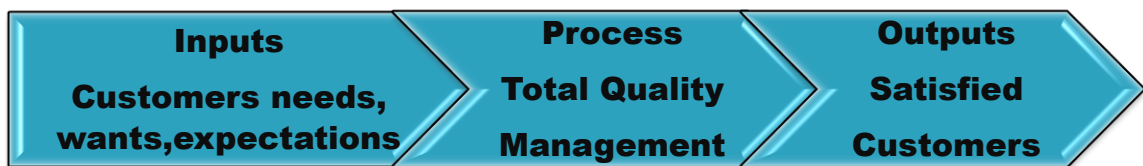


Figure 3: Total Quality Management process (Barkley and Saylor 2001)

Hasmi (2000-2004) on his research defined Total Quality Management as a philosophic movement that integrates organizational activities to focus on customer's needs and organization's objectives. Landy and Conte (2004) noted that Total Quality Management does not only concentrates on production but also on customer demands and expectations.

3.3.2 Total Quality Management and Financial Services

Most bankers would like to believe that banks are in the finance industry and not in the service industry. Therefore they tend to compete in terms of financial prowess rather than service quality. Total quality management which is about total customer service and continuous customer satisfaction is applicable not only in the manufacturing industry but in service sector as well where the customer is just as important. The banking industry often the biggest service industry in a country, stand to benefit from Total Quality Management. Many financial institutions describe Total Quality Management (TQM) as a methodology for continuous monitoring and incremental improvement of a supply-line process by identifying causes of variation and reducing them.

McKennie in the early 1990s identified two characteristics that are common in the financial services:

- i. *'The fiduciary responsibility'*.
- ii. *'The two-way information flow'*.

Swift, Ross and Omachonu (1998) pointed that it is more difficult to define quality in services than quality in products, because service organizations like

financial institutions are affected by factors such as the final output of the service and the customer satisfaction.

On 'Juran's Quality Handbook' (1999) financial services are defined as 'services related to cash and other financial assets.' Also the handbook presents seven types of services that institutions in the financial industry may perform:

- ❖ *'Safekeeping of customer's currency or other assets and fiduciary responsibility of them'.*
- ❖ *'Conversion, transfer, and transformation of currency and other customer assets'.*
- ❖ *'Adding value to customer's assets by means which may include return on deposits, investment and loans, insurance'.*
- ❖ *'Underwriting or guaranteeing customer projects through some combination of advice, marketing of customer instruments, and guarantee of minimum financial support'.*
- ❖ *'Interacting with customers in a variety of ways, including sales presentations', responding to customer service inquires and providing advice'.*
- ❖ *'Accounting and reporting to detail and summarize the transactions related to the customer's relationship, including billing and tax information'.*
- ❖ *'Providing a profit to the owners of the company-those who provide the operating capital'.*

Burton and Philip (1999) from their study discovered that Total Quality Management is a powerful technique that can innovate employee creativity

reduce bureaucracy and cost and improve the organization's outcomes- services or products-. The Edward's and Smith's research (1999) regarding Total Quality Management and banking sector provided as a result that the best way to ensure quality in a financial organization is to establish training programs for the employees in order to make employees understand customer's needs.

Beckett (2000) added also three characteristics that distinguish financial services:

- i. *'Transparency of performance'*.
- ii. *'Uncertainty of outcome'*.
- iii. *'Poor Comparability'*.

Harison (2000) and Howcroft (2003) presented the following characteristics regarding services:

- i. *'Intangibility'*.
- ii. *'Inseparability'*.
- iii. *'Perishability'*.
- iv. *'Heterogeneity'*.

Evans (2002) noted that *'service can be defined as any primary or complementary activity that does not directly produce a physical product'*.The North American Industry Classification System (NAICS) described service organizations the ones that engaged to provide a variety of services to individuals, to other organizations and government establishments.The service organizations are the retailers, the real estate the public organizations and the financial services.Quality principles that apply to manufactured

products can be apply too in service products.The service outcome must respond to customer needs according to Evans and Lindsay (2002).They continued by presenting five key dimensions of service quality that contribute to customer perceptions:

- i. *'Reliability: the ability to provide what was promised.'*
- ii. *'Assurance: the knowledge and courtesy of employees'.*
- iii. *'Tangibles: the physical facilities and equipment'.*
- iv. *'Empathy: the degree of invidual attention to customers'.*
- v. *'Responsiveness: the willingness to help customers'.*

Pande and Holpp (2002) explained the DMAIC methodology as a process of Total Quality Managemnt and how this process could be applied in the financial sector.The DMAIC methodology is made up of the following tasks:

- ❖ *Define* the problem, issue or concern.
- ❖ *Measure*, develop or use existing metrics to obtain a measure of the problem.
- ❖ *Analyze* the problem using the available data, identify the cause of the problem and recommend asolution.
- ❖ *Improve*, execute actions plans and implement recommended solutions.
- ❖ *Control*, monitor the impact of the actions taken or the solutions implemented and make adjustments to further improve.



Figure 4: DMAIC process

Zia ul Haq (2005) through his research on Total Quality Implications on financial sector concluded that Total Quality Management principles can not achieve customer's satisfaction if there is no employee commitment.

Total Quality Management as a managerial approach interferes to financial organizations management through the Plan, Do, Check Act (PDCA) cycle. The PDCA cycle figure 4 created by Deming (1950) is introduced to organization as a problem solving process. This problem solving process is needed nowadays more than ever in the financial industry after the crisis of September 2008.

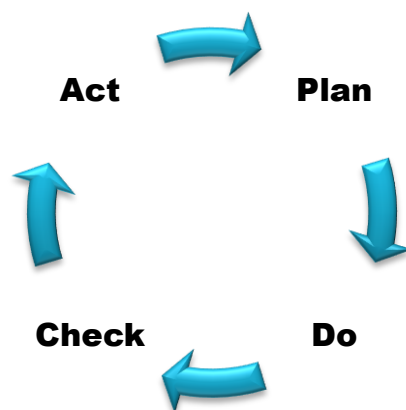


Figure 5: PDCA cycle

3.3.3 Customer and Quality

In Japanese a single word -okyakusam- includes a double meaning, 'customer' and 'honorable guest'. Many organizations around the world are focused on meeting and achieving customer satisfaction. Noriaki Kano (1980)

categorized customers in three levels regarding the satisfaction provided from products or/and services. These levels are :

- ❖ *Dissatisfy*
- ❖ *Satisfy*
- ❖ *Delighed*

The customer is the person or the organization that will receive the product, service, result being delivered. The customer may also supply the business case and provide approved funding for the project. The customer identifies the business requirements for the project and accepts the project's deliverables. Customer who will be the ultimate user of the product or/and service is the external customer. As customer also is characterized the next step of a process in the organization. This is an internal customer. The Total Quality Management principles focus on satisfying both external and internal customers. On Juran's Handbook (1999) are listed the types of external customers:

- i. *'The purchaser'*
- ii. *'The end user/ultimate customer'*
- iii. *'Merchants'*
- iv. *'Processors'*
- v. *'Suppliers'*
- vi. *'Original equipment manufactures'*
- vii. *'Potential customers'*
- viii. *'Hidden customers'*

As internal customers on Juran's Handbook (1999) defined everyone in the organization who plays the role of supplier, processor and customer.

The customer driven quality concept is related not only to customer satisfaction given from a product or service. The concept goes beyond meeting customers requirements. (Juran's Handbook 1999). Customer driven quality concept seems to be a strategy that involves customer in the production of goods or services.

Hackl and Westlund (2000) stated that customer satisfaction is a key element for customer retention and loyalty and assist and accelerates the organization performance. Harry and Schroeder (2000) gave the following definition about quality: *'is the state in which value entitlement is realized for the customer and provider in every aspect of the business relationship.'*

Bank (2000) stated that customer poses five questions regarding the product or service:

- i. *'What can I expect when I buy your product/service?'*-specification-
- ii. *'Is it what I expected?'*-conformance to specification-
- iii. *'Does it continue to do what I expected?'*-reliability-
- iv. *'How much do I have to pay?'*-value-
- v. *'When can I have it?'*-delivery-

According to Bank (2000) these five questions were the five dimensions of quality which satisfy customer needs and expectations.

The CH2M HILL's Project Delivery System (PDS) (2001) pointed as a primary goal the customer satisfaction as it is showed from the figure 6.

This model comprises four organizational elements that help people work together and deliver results to delight customers. The feedback received from

customers is essential for the project teams' abilities to develop, improve and implement the PDS model (CH2M HILL 2001).



Figure 6: PDS model

Quality is the critical factor for the success of this model and it is interfered in these four elements. The Total Quality Management principles: **1)** Focus on customer, **2)** Continuous improvement, **3)** Employee involvement, **4)** Effective leadership, **5)** Management by fact is close relate with the PDS model and assist to customer satisfaction.

Barkley and Saylor (2001) stated that customer satisfaction in a customer driven project is a function of four key forces:

- i. *'Expectations, informed by project developments and insights gain prior or during the project.'*
- ii. *'Feelings about the project manager and team.'*
- iii. *'Feedback from stakeholders.'*
- iv. *'Project performance.'*

Knowing all internal and external customers in a customer driven project is essential. Customers needs are not stable and the needs and requirements are in a continuous change therefore in a customer driven project the project

team ought to listen the customer and be able to monitor the product or/and service if still satisfy them ,Barkley and Saylor (2001).

Evans (2002) in his effort to determine the relationship between customer and quality created an equation:

Perceived quality= Actual quality-Expected quality where:

Expected quality is true customer needs and expectations.

Actual quality is the outcome of the production process that is delivered to customer.

Perceived quality is the true belief of customer for the quality of the product or service.

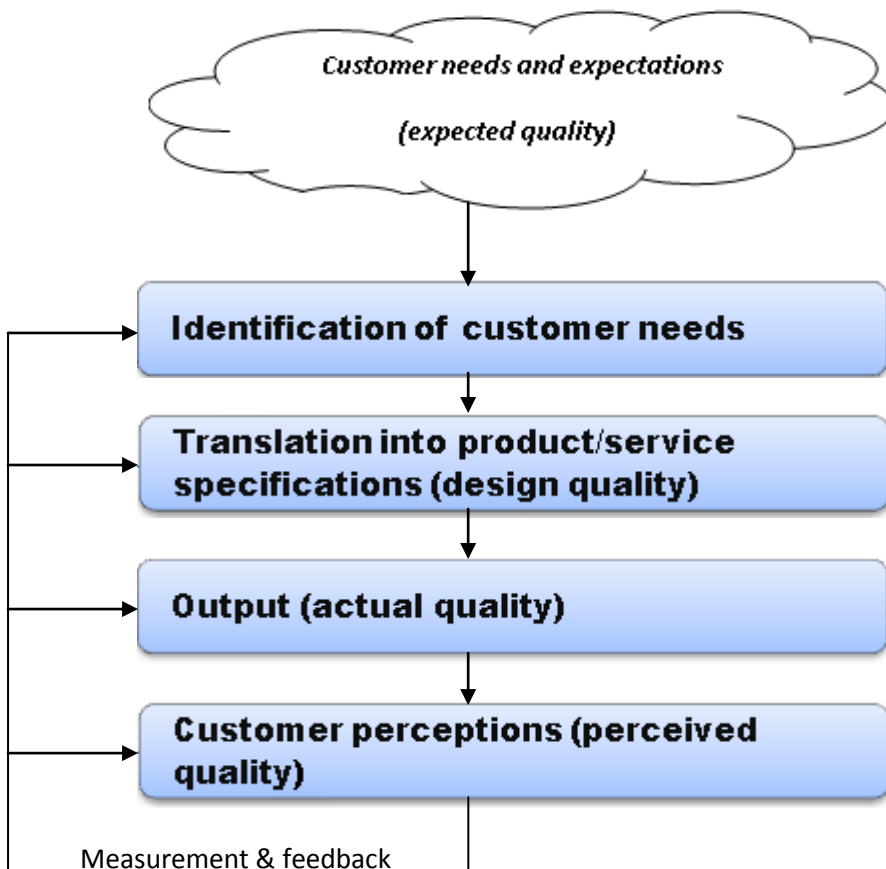
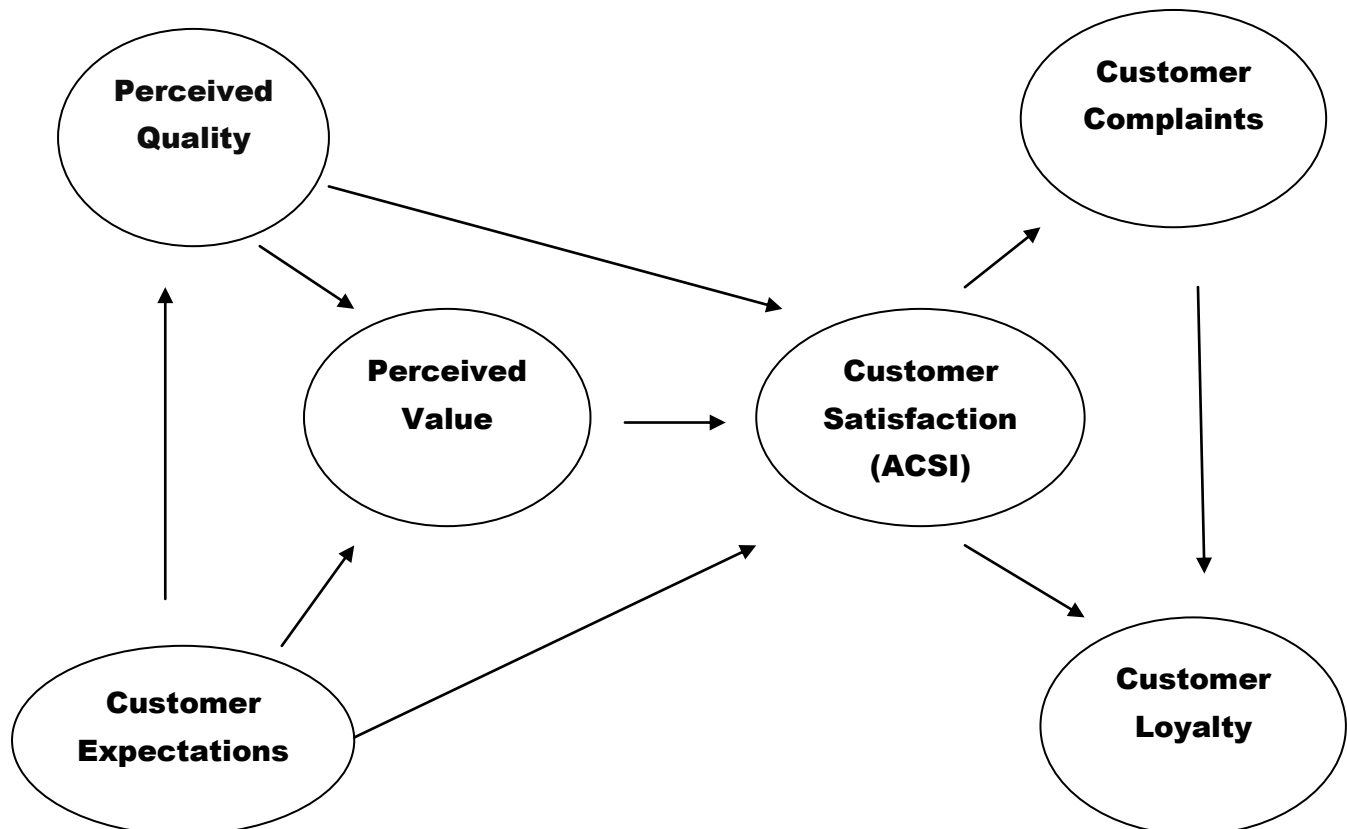


Figure 7: Customer-Driven Quality Cycle

The American Society for Quality (ASQ) established the first American Customer Satisfaction Index (ACSI) figure 7 which was adapted through years from firms around the globe in order to measure customer satisfaction.

**Figure 8: ACSI Model**

3.4 Project Management in Financial Sector

Since project management is the new wave of the future in global business financial sector seems that is ready to adapt project management principles. After the economic crisis of September 2008 the annual rates of financial institutions in the stock market minimized. Higher management in every financial institution around the globe seeks new ways to develop new products or/and services in order to regain market's trust. Project

management is needed than ever. By defining project's characteristics it is obvious that a project :

- i. Creates a unique product service or result.
- ii. Temporary, has define beginning and define end.
- iii. Has a specific objective or outcomes.
- iv. Ends when project objectives/deliverables have been achieved.
- v. Has an approved budget and limited resources.

Financial Sector is the backbone of any economic system around the globe. New service products is the key to future growth and prosperity of financial institutions. Project management helps financial services firms to reduce cost and deliver high quality products and/or services . Many financial firms recognize that disciplined project management can:

- i. Reduce cost and increase the value delivered for projects and services.
- ii. Set project and delivery management standards without micromanaging delivery.
- iii. Gain buy-in and support across all levels of the organization.
- iv. Achieve a balanced level of continuous program management maturity improvement.
- v. Automate processes and reporting using appropriate software tools and a centralized repository.

Some of the projects in the financial industry are already initiated and are related either with the internal infrastructure of the financial institution or with new products or/and services that are introduced in the market.

Thus as new projects could be characterized the:

- i. New product development.
- ii. IT infrastructure improvement.
- iii. Special projects mandated by Federal Regulators.
- iv. Business integrations through acquisition.
- v. Initiation of e-banking processes.
- vi. Processes improvements such as the back office acquisition unit of credit cards.

Authors through time gave definitions regarding project management. Breyfogle, (2003) stated that '*Project management is the management, allocation and timely use of resources for the purpose of achieving a specific goal*'. As its is defined on PMBOK Guide (third edition 2004) Project Management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. The triple constraint-project scope, time and cost is the key factor for project's success.

'The principles of project management can be applied to any type of project and to any industry. Companies that sell products or services ought to have good project management practices'. (Kerzner 2006)

Meredith and Mantel (2006) recognized three primary forces behind project management:

- i. '*The growing demand for complex customized goods and services.*'
- ii. '*The exponential expansion of human knowledge.*'
- iii. '*The global production-consumption environment.*'

They continued with the statement that project management is being recognized as a valuable path that many organizations follow in order to achieve growth and maintenance in the market.

Many financial leaders around the globe including **Bank of America**, **Citigroup**, **JP Morgan**, **HSBC**, and **Deutsche Bank** initiate the project management as an organizational strategy for growth, setting goals such as:

- ❖ To improve cycle time financial services.
- ❖ To improve service.
- ❖ To reduce cost.

The Project Management Offices that already existed in the organizations now are in the front line of every organization's action related with the growth and stability. The level of success of this effort depends on how rapidly the constraints of project management-time, resources and cost- will be adapted both from the employees and the higher management.

Examples where principles of project management are initiated can be found in many subsectors of financial industry. In real estate the project management tasks continue to present challenges. Therefore real estate companies attempt to increase project management efficiency and quality by implementing new standards and procedures.

The Project Management Institute through studies such as the OPM3 (Organizational Project Management version 3) provide strategies in a challenge environment which can provide solution to key difficulties. In financial organizations such as banks where the Information Technology

infrastructure changes rapidly projects ought to be accurate and accomplished with success. A Supplier-Input-Process-Output-Customers (SIPOC) method is a major characteristic in these kinds of projects and the deliverables could be either internal or external.

3.5 Project Quality Management and Customers

Projects are closely related with customers. Customers are part of the project and it seems that projects are becoming customer driven in order to achieve customer satisfaction. While the wide debate continues on the role and function of the customer in project quality management there will be no such debate in the future as the customer becomes a full partner and member of the project team.

One basic characteristic of Operational Management is Project Management and how its techniques are beneficial for an organization. Project Quality Management as a division of Project Management provides the basis for achieving project's goal and leads to customer's satisfaction. The Project Quality Management presents the quality attributes that assist to customer satisfaction.

Barkely and Saylor (2001) noted that project quality management *'is the process of integrating and managing quality into the core project management process rather than using quality tools simply to inspect and appraise the work after the fact'*.

According to (PMBOK Guide 2004) *'Project Quality Management processes include all the activities of the performing organization that*

determine quality policies, objectives and responsibilities so that the project will satisfy the needs for which it was undertaken'.

In a customer driven project the techniques, the practices and the tools, of Total Quality Management can be used in order to provide customer satisfaction. The success of the project depends on the professionalism that employees must have and that the customer is project's voice (Barkley & Saylor, 2001).

In many organizations around the globe both project management (P.M) and total quality management are separated (T.Q.M).This disadvantage affects customer satisfaction. From the early 1990's organizations started to adapt project management practices in combination with the total quality management philosophy.Both Total Quality Management and Project Management can provide a systematic, disciplined,flexible adaptable approach for producing deliverables,imporiving organizational performance and moving toward continuous improvement ,focused on customer satisfaction.(Barkley & Saylor, 2001).

The Project Quality Management Processes includes:

- i. *Quality planning*: identifying which quality standards are relevant to the project and how to satisfy them.
- ii. *Quality assurance*: evaluating overall project performance to ensure the project will satisfy the relevant quality standards.

- iii. *Quality control*: monitoring specific project results to ensure that they comply with the relevant quality standards while identifying ways to improve overall quality.

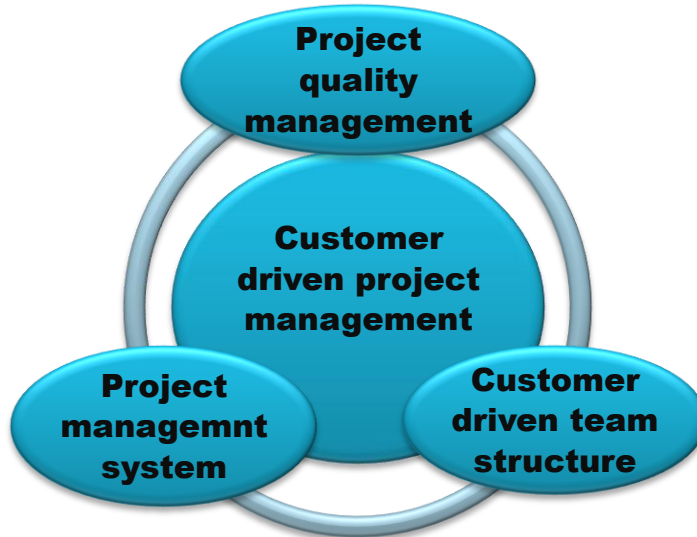


Figure 9: Customer Driven Project Management

The modern quality management is customer centric. The key factors are:

- i. Customer satisfaction.
- ii. Prevention over inspection.
- iii. Management responsibility.
- iv. Processes within phases.

The competitive market is the main characteristic of the world economy. Products and/or services are available in the market but that does not mean that all are being sold. Customers nowadays are more selective than ever. They buy this product or/and service which meets their highest requirements and expectations. Nowadays customers have more options in choosing that is appropriate for their needs, what is suitable. Organizations

from their side in order to maintain the existed customers and attract new ones change their policies regarding the offer of products and services.

The Project Quality Management practices are critical for long term growth of the organizations. Therefore every project that is initiated is customer centric and customer driven. Customer's role is very important and the received feedback is related with project's success. Customers are more market conscious than ever.

3.6 Summary

By applying Quality Management techniques issues can be analyzed and resolved and efficient processes can be designed and implemented. Meeting customer's requirements is important because it is clearly defined the product or service that customer needs and how this product could be marketable and profitable in the future.

Total Quality Management is actually a critical 'business objective' that needs constant focus to ensure that the defined objective is achieved. It is defined this way that the quality of products and services delivered to customers meet or exceed their expectations.

The literature review provide information regarding the relationship among project management, total quality management, project quality management and how these management practices interact in order to achieve customer satisfaction. Principles from the above management practices are used at the section of the results and conclusions of this thesis.

4. Methodologies and procedures used in the study

4.1 Overview

The methodology includes a further presentation of credit card back office process from a financial institution in which a quality tool applied in order to measure the outcome of the process which is related with the customer satisfaction. Furthermore a Taguchi L9 (3^4) orthogonal array experiment is applied for investigating non-linear effects considering as main factors the customer satisfaction as a result of the back office process, the lead time that the application of the process needs and also the back office and investigation process function. Taguchi's Design of Experiment (DoE) provides critical feedback, while this experiment application seems to be pioneer for a back office process, and measures the quality in the final outcome since it is one of the most critical tools of quality and process improvement.

A credit card portfolio can be easily demanding therefore a wide range of effective process is required to manage acquisition units, back office servicing teams and card holder support center. An acquisition unit is responsible to manage efficiently the incoming applications across the sales channels (distribution and external vendors). The back office servicing teams manage card production, credit scoring and payment processing. A cardholder support center monitors cardholder's account or credit inquiries.

The implementation of the quality tool in the process is a project which is monitored, controlled and evaluated from the Project Management Office of the financial institution. The desirable results target the improvement of the process and thus will generate the growth of the customer base. The process

supports a full card lifecycle from sales channels ,the customer acquisition unit until the final approval or reject status.Customer in this process headed as the core and the received feedback regarding quality standards determines the process improvement success.

4.2 Back Office Reconciliation and Investigation Process

Process definition:

'A process is an activity or groups of activities that takes an input, adds value to it and provides an output to internal or external customer'.

Process overview

This is to define the Back Office process flow for Incoming Cards Applications which aim to:

- i. Faster processing and booking of applications.
- ii. Improved control and monitoring of application status.

I – General

The relevant process will be supported by a project team and describes the processing of the incoming applications through:

- i. Distribution Sales Channel
- ii. Vendor 1 (external sales), and
- iii. Vendor 2 (external sales).

II – Description

❖ Receipt of Incoming Applications:

The Back Office employees receive the daily cards application production with a delivery cover sheet that includes the total number of the applications by product type, sales point and the names of the applicants.

❖ Checking of application:

The Back Office employees check that:

- i. There is the *applicant's signature* on the appropriate field of the form, otherwise the application is returned to the sales point.
- ii. The *Sales Point Number (SPN)* is included; otherwise a generic SPN is completed. The sales point number defines the sales channel.
- iii. The *Source Code* is included, otherwise the application is returned to the sales point.
- iv. The income and the age of the applicants fulfil the minimum credit requirements of the Bank and a copy of ID/Passport is attached.

❖ Separation on products (Visa or MasterCard):

The Back Office employees separate the credit card applications in a daily basis in products either Visa either Master Card.

❖ Applications are counted:

The Back Office employees count the credit card applications in a daily basis in order to provide accurate information regarding the total amount of production. These data are sent to the marketing department.

❖ Scanning:

The Back Office employees scan the hard copies of the credit card applications in order to enter clients' data in a preliminary data base.

❖ Correction:

The Back Office employees correct the clients data (if the fields of the credit card application are not fill in correctly) in order to be accurate while they will be uploaded for investigation.

❖ Files are uploaded to Investigation System:

The Back Office employees zip and uploads scanned and corrected files to the investigation system of the bank in order the credit card application be approved or rejected.

❖ Investigation process:

The Back Office employees follow a specific process with which investigate the income, the deposits, and the age, the credibility of each client who applies for a credit card and approves or rejects the application. The minimum time of the answer is two working days.

❖ Special cases:

During the daily process some of the credit card applications are remaining in a queue 'stand by' because some of the requirements are not appropriate. Like inaccurate income documents, or invalid ID/Passport. These applications are handling with a specific process until the requested terms are completed.

Back office process flow chart

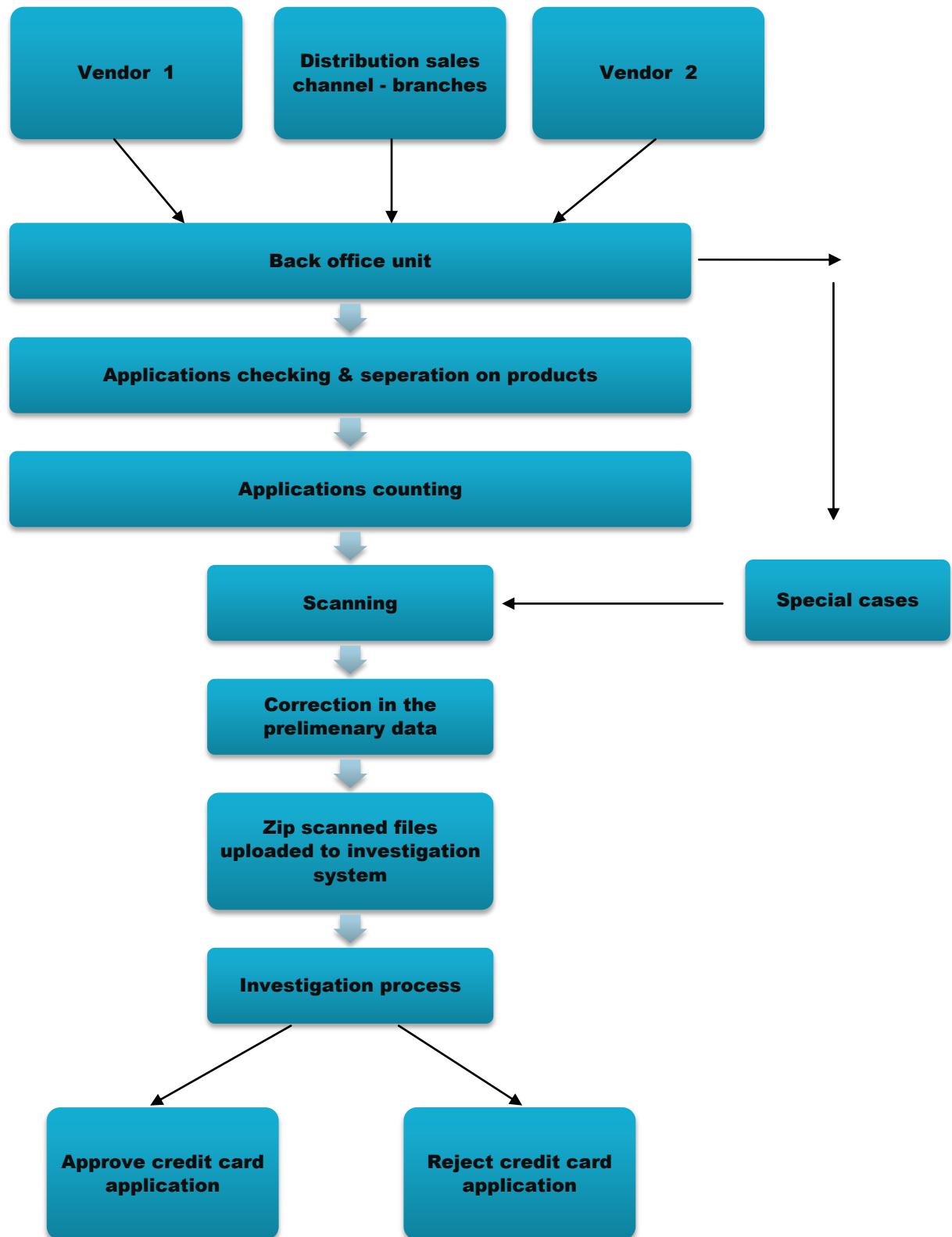


Figure 10: Back Office process flow chart

4.3 L9-TAGUCHI Design of Experiment (DOE)

Taguchi's belief, as it is presented on 'A primer on the Taguchi Method' (Ranjit Roy 1990), is that firms must improve quality on a product or process during the designing and building phase. Furthermore Taguchi refers to experimental design as 'off-line quality control' because it is a method of ensuring good performance in the design stage of product or processes. The aim is to make a product or a process less variable (more robust) in the face of variation over which there is little or no control. Design of Experiments (DoE) as a statistical technique can improve therefore the performance of the product or the process design. The Design of Experiment (DoE) process is a scientific approach to understand how the input affects the output. In the case study the product is replaced with the process-project which is initiated from the Project Management Office. The Project Management Office targets to improve the process.

Taguchi (1986) noted that a quality characteristic can follow one of the three possible optimization directions which are:

- i. 'Smaller-the-better' quality characteristic. Rank one is assigned to data observation entry possessing the smallest magnitude, rank two is to the next smaller and so on.
- ii. 'Larger-the-better' quality characteristic. Rank one is assigned to data observation entry possessing the largest magnitude, rank two is to the next larger and so on.
- iii. 'Nominal-is-best' quality characteristic. Rank one is assigned to the data observation with the smallest absolute discrepancy with respect to the nominal value, rank two the next smaller and so on.

The *Dataplot Reference Manual* (1997) for the Taguchi SN-PLOT describes the Taguchi signal-to-noise plot for the “smaller is better” and “larger is better” case. Thus the **Taguchi SN- plot** answers the question: “What level of the independent variable yields the “best” value of the response (as measured by the largest value of the signal-to-noise ratio)?” The “-” in SN- stands for “smaller-is-better.” For this “smaller is better” case, the signal-to-noise ratio is defined as: $S/N = -10 \cdot \log_{10} \left(\frac{\sum y^2}{N} \right)$ and for the “larger-the-better” case, the signal-to-ratio is defined as $S/N = -10 \cdot (\log (\sum (1/y^2)/n))$. Where **N** is the number of observations in the subsample and **y** is the data observations in the subset. The Taguchi SN+ plot consists of the following: **Vertical axis** = the Taguchi S/N value for each sub-group; **Horizontal axis** = sub-group designation. A reference line is drawn for the full sample S/N ratio. The above table will be used to provide the data for the observations and measurements.

PERSONNEL	VENDOR NETWORK	APPLICATION PROCESSING	SELECTION CRITERIA	Lead Time	Back Office Reconciliation & Investigation process	Customer Satisfaction

Table 3: L9-Taguchi experiment factors

The inputs are the personnel, the vendor network, the application processing and the selection criteria. The outputs are the lead time, the back office reconciliation and investigation process and the customer satisfaction.

The number 9 which follows the 'L' presents the number of the runs in the design.

The methodology presented in this study is the most appropriate for any combination of responses proposed by Taguchi's aims, 'Smaller -the-better', 'Larger-the-better' and 'Nomimal-the-best'. A six step Design of Experiment (DoE) process encloses the orthogonal array concept that is based on Taguchi's principles. Thus:

i. Step 1: problem identification.

The first step is important because specifies which parts of the process need investigation.

ii. Step 2: identification of quality characteristics and the control of factor settings.

In this step are pointed the inputs and the outputs of the process.

iii. Step 3: orthogonal array selection.

This step selects the experiment settings.

iv. Step 4: trial conduction.

During this step trial runs are being set in order to define the effects during every random change of the factors.

v. Step 5: data analysis on weighted responses.

Data are converted in from original variables to ranks that will conclude to a single master response.

vi. Step 6: confirmation experiment.

The settings from each factor which have a statistical importance assist in the estimation of the responses.

An Analysis of Variance (ANOVA) is a statistical data analysis tool that provides the different types of variance analysis. Father of Analysis of Variance (ANOVA) is **Ronald Aylmer Fisher (1890-1962)**. The types of Analysis of Variance (ANOVA) are the following:

- i. Anova: single factor.
- ii. Anova: two-factor with replication.
- iii. Anova: two-factor without replication.

The case study that is used is based on an Anova: two -factors with replication.

ANOVA Table

Source of Variation	SS	df	MS	F
Between	$SS_{between} = \sum_{j=1}^j n_j (\bar{Y}_j - \bar{Y})^2$	$j-1$	$MS_{between} = \frac{SS_{between}}{j-1}$	$\frac{MS_{between}}{MS_{within}}$
Within	$SS_{within} = \sum_{j=1}^j \sum_{i=1}^{n_j} (Y_{ij} - \bar{Y}_j)^2$	$n-j$	$MS_{within} = \frac{SS_{within}}{n-j}$	
Total	$SS_{total} = \sum_{j=1}^j \sum_{i=1}^{n_j} (Y_{ij} - \bar{Y})^2$	$n-1$		

Table 4: ANOVA calculations

Where:

SS (Sum of Squares). This is the measures of the variation around the mean. There are usually three different values of SS calculated:

- i. **SSG** measures variation of the group means around the overall mean (**Between Groups**).
- ii. **SSE** measures the variation of each observation around its group mean (**Within Groups**).

- iii. **SST** measures variation of the data around the overall mean (**Total**).

DF (Degrees of Freedom). This is the factor that adjusts for how large the groups are and the number of groups being considered. They are calculated as follows:

- i. Number of Groups (j) – 1 for SSG.
- ii. Sample Size (n) – Number of Groups (j) for SSE.
- iii. Sample Size (n) – 1 for SST.

MS (Mean Square) . This is $MS=SS/df$. This is like a standard deviation. Its numerator is the sum of squared deviations (**SS**), divided by the appropriate number of degrees of freedom.

F (F-Statistic or F-Ratio). This is $F=MSG/MSE$. This is the proportion of variation between the groups compared to the variation within the groups.

- i. In general, the larger this value is, the more likely the variation between the groups is significant.
- ii. The level of significance is determined by comparing it to the F-Critical value for the samples. If the F-Statistic is larger than F-Critical, then the variation between the groups is statistically significant.

The goal by using Analysis of Variance (ANOVA) is to evaluate the meaning of several different factors and their potential interactions. Analysis of Variance can be used as a guide to determine whether or not an event was most likely due to the random change of natural variation. The received data from the back office process were introduced to **mititab v.15** software in

order to produce the Analysis of Variance for the three main factors of the back office process.

Minitab v.15 provides both static and dynamic response experiments:

- i. In a static response experiment, the quality characteristic of interest has a fixed level.
- ii. In a dynamic response experiment, the quality characteristic operates over a range of values and the goal is to improve the relationship between an input signal and an output response.

Minitab v.15 calculates response tables and generates main effects and interaction plots for:

- i. Signal-to-noise ratios(S/N ratios, which provide a measure of robustness) versus the control factors.
- ii. Means (static design) or slopes (dynamic design) versus the control factors.
- iii. Standard deviations vs.the control factors.
- iv. The natural log of the standard deviations versus the control factors.

To choose the design it is needed to:

- i. Identify the number of control factors that are of interest.
- ii. Identify the number of levels for each factor.
- iii. Determine the number of runs that can be performed.
- iv. Determine the impact of other considerations (such as cost, time, or facility availability) by choosing the design.

5. Results

5.1 Overview

The data on the above table received from the back office process, indicate the minimum and the maximum number of available factors for each design and will be used for the observations and measurements. Therefore:

PERSONNEL	VENDOR NETWORK	APPLICATION PROCESSING	SELECTION CRITERIA	Lead Time	Back Office Reconciliation & Investigation Process	Customer Satisfaction
P1	B	Current	X	2	2	7
P1	V1	D	1000	3	2	6
P1	V2	Dp	45000	2	4	8
P2	B	D	45000	4	2	8
P2	V1	Dp	X	3	4	7
P2	V2	Current	1000	2	3	3
P3	B	Dp	1000	2	2	9
P3	V1	Current	45000	4	2	5
P3	V2	D	X	3	4	5

Table 5: L9-Taguchi experiment factors and received data

- i. **Personnel (P1, P2, and P3):** The personnel indicates the back office employees.
- ii. **Vendor Network (B, V1, and V2):** The vendor network indicates the sales channels.
- iii. **Application Processing (Current, D, and DP):** The application processing indicates the current process and the possible changes (D, Dp) on the process.
- iv. **Selection Criteria(X, 1000, 45000):** The selection criteria indicate the credit limit of the credit card.
- v. **Customer satisfaction:** Customer satisfaction is measured with rank 1 to 10 where 10 is the delight customer.
- vi. **Lead time:** The lead time indicates the working days for the application to be approved or rejected.

- vii. **Back office Reconciliation & Investigation process:** The back office reconciliation and investigation process indicates the working days of the process.

5.2 RESPONSE: Lead Time

Analysis of Variance for SN ratios

Source	DF	Seq SS	Adj SS	Adj MS	F	P
PERSONNEL	2	8,0550	8,0550	4,02751	*	*
VENDOR NETWORK	2	16,3239	16,3239	8,16193	*	*
APPLICATION PROCESSING	2	16,3239	16,3239	8,16193	*	*
SELECTION CRITERIA	2	12,2176	12,2176	6,10881	*	*
Residual Error	0	*	*	*		
Total	8	52,9204				

Table 6: Analysis of Variance-Lead Time

The calculations present the numerical results regarding the lead time. The sum of the squared deviations from the Vendor networking and the Application processing has the biggest dispersion (MSs = 8,16193). The dispersion indicates that these two sources need improvement.

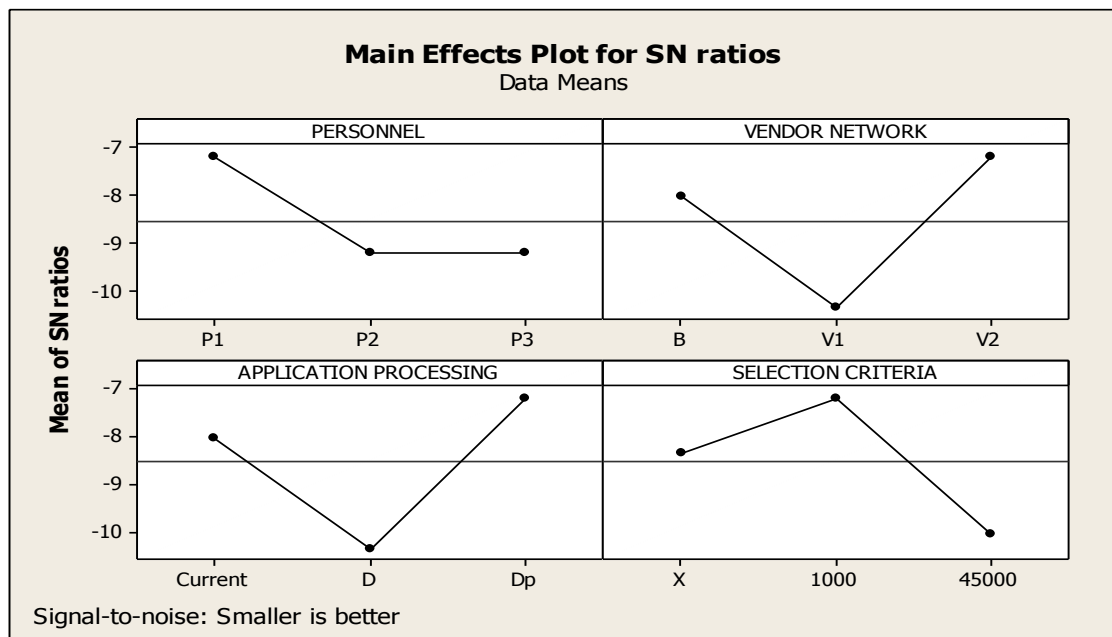
Response Table for Signal to Noise Ratios: Smaller is better

Level	PERSONNEL	VENDOR NETWORK	APPLICATION PROCESSING	SELECTION CRITERIA
1	-7,195	-8,027	-8,027	-8,368
2	-9,201	-10,375	-10,375	-7,195
3	-9,201	-7,195	-7,195	-10,034
Delta	2,007	3,181	3,181	2,840
Rank	4	1	2	3

Table 7: Response –Lead Time

The response table shows the average of the selected characteristics for each level of the factors. The response table includes ranks that are based on

the Delta statistics which compare the relative magnitude of effects. The Delta statistics is the highest average for each factor minus the lowest average for each factor. The ranks are assigned based on Delta values, so rank 1 is assigned to the highest Delta value, rank 2 to the second and so on. The response table and the main effects plots for the signal-to-noise(S/N) ratios provide information for the factors which have the greatest effect on the S/N ratio and in this case is 'smaller-is-better' regarding the lead time. The factor with the biggest impact on the S/N ratio is Vendor Network (Delta=3,181, Rank=1). Also by observing the response table it is obvious that the next factor is the Application Processing with similar S/N ratio (Delta=3,181, Rank=2). The main effects plot provides a graph of the averages in the response table. The plot shows the effects that caused by occupying more the Personnel (P1, P2, and P3), the Vendor Network (V1, V2, and Branches), the new versus the current application processing and the selection criteria.



Graph 1: Lead Time

The graph 1 shows the group of responses, regarding the lead time, and what levels must be improved for achieving the maximum lead time.

5.3 RESPONSE: Back Office Reconciliation&Investigation process

Analysis of Variance for SN ratios

Source	DF	Seq SS	Adj SS	Adj MS	F	P
PERSONNEL	2	2,7563	2,7563	1,3781	*	*
VENDOR NETWORK	2	41,0570	41,0570	20,5285	*	*
APPLICATION PROCESSING	2	12,7857	12,7857	6,3928	*	*
SELECTION CRITERIA	2	12,7857	12,7857	6,3928	*	*
Residual Error	0	*	*	*		
Total	8	69,3847				

Table 8: Analysis of Variance –Back Office Reconciliation&Investigation process

The calculations present the numerical results regarding the back office reconciliation and investigation process. The sum of the squared deviations from the Vendor networking has the biggest dispersion (MS=20, 5285). The dispersion indicates that this source need improvement.

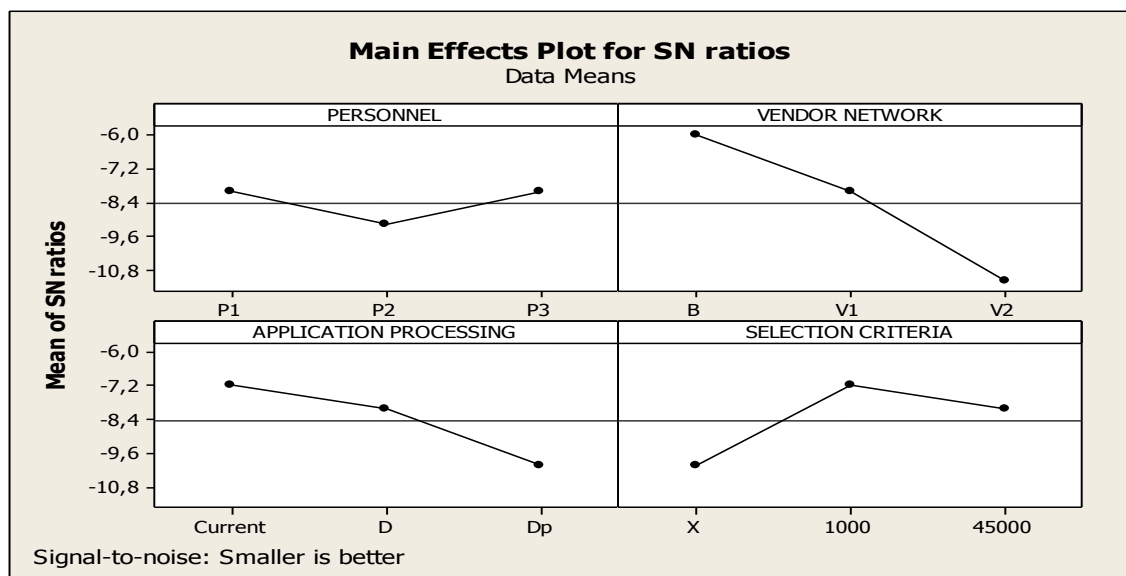
Response Table for Signal to Noise Ratios: Smaller is better

Level	PERSONNEL	VENDOR NETWORK	APPLICATION PROCESSING	SELECTION CRITERIA
1	-8,027	-6,021	-7,195	-10,034
2	-9,201	-8,027	-8,027	-7,195
3	-8,027	-11,208	-10,034	-8,027
Delta	1,174	5,188	2,840	2,840
Rank	4	1	2,5	2,5

Table 9: Response-Back Office Reconciliation&Investigation process

The response table shows the average of the selected characteristics for each level of the factors. The response table includes ranks that are based on

the Delta statistics which compare the relative magnitude of effects. The Delta statistics is the highest average for each factor minus the lowest average for each factor. The ranks are assigned based on Delta values, so rank 1 is assigned to the highest Delta value, rank 2 to the second and so on. The response table and the main effects plots for the signal-to-noise (S/N) ratios provide information for the factors which have the greatest effect on the S/N ratio and in this case is 'smaller-is-better' regarding the back office reconciliation and investigation process. The factor with the biggest impact on the S/N ratio is Vendor Network (Delta=5,1888, Rank=1). Also by observing the response table it is obvious that the next factors are the Application Processing and Selection Criteria with similar S/N ratios (Deltas=2,840, Ranks=2,5). The main effects plot provides a graph of the averages in the response table. The plot shows the effects that caused by occupying the Personnel (P1, P2, and P3), the Vendor Network (V1, V2, and Branches), the new versus the current application processing and the selection criteria.



Graph 2: Back Office Reconciliation&Investigation process

The graph 2 shows the group of responses, regarding the back office and reconciliation process, and what levels must be improved for achieving the maximum working flow.

5.4 RESPONSE: Customer Satisfaction

Analysis of Variance for SN ratios

Source	DF	Seq SS	Adj SS	Adj MS	F	P
PERSONNEL	2	6,0910	6,0910	3,0455	*	*
VENDOR NETWORK	2	26,3141	26,3141	13,1571	*	*
APPLICATION PROCESSING	2	30,9694	30,9694	15,4847	*	*
SELECTION CRITERIA	2	5,9167	5,9167	2,9584	*	*
Residual Error	0	*	*	*		
Total	8	69,2912				

Table 10: Analysis of Variance-Customer Satisfaction

The calculations present the numerical results regarding the customer satisfaction. The sum of the squared deviations from the Application processing has the biggest dispersion (MS=15, 4847).The dispersion indicates that this source need improvement.

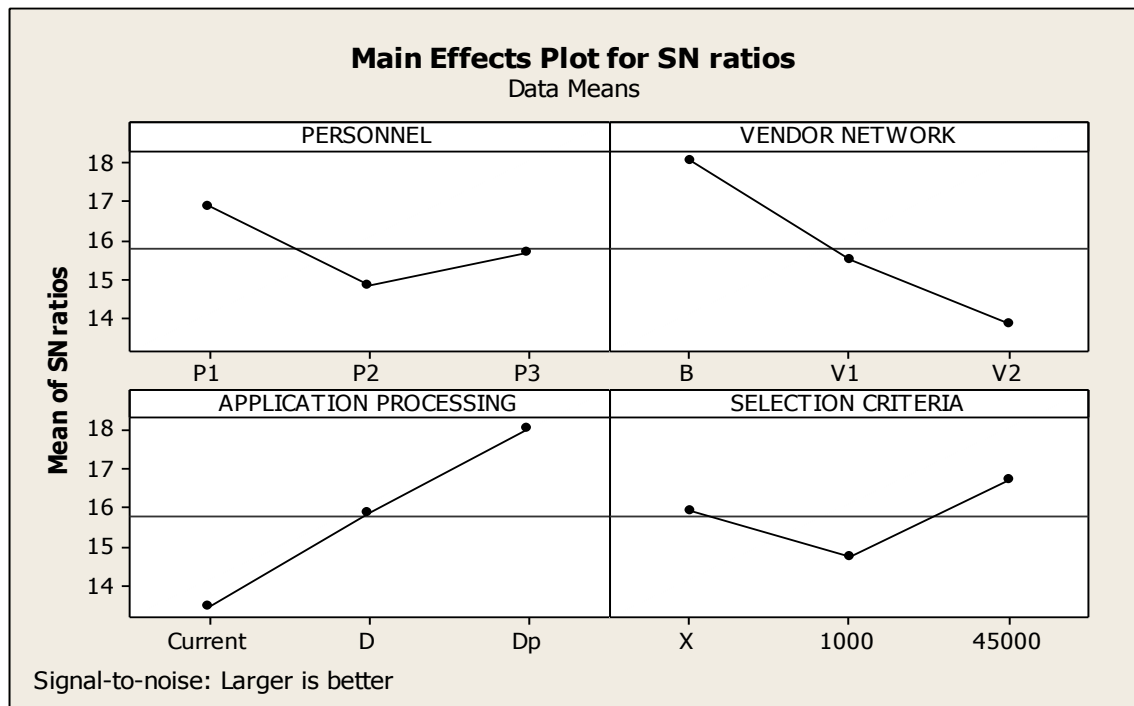
Response Table for Signal to Noise Ratios: Larger is better

Level	PERSONNEL	VENDOR NETWORK	APPLICATION PROCESSING	SELECTION CRITERIA
1	16,84	18,02	13,47	15,93
2	14,84	15,48	15,87	14,73
3	15,68	13,86	18,02	16,70
Delta	2,01	4,15	4,54	1,97
Rank	3	2	1	4

Table 11: Response –Customer Satisfaction

The response table shows the average of the selected characteristics for each level of the factors. The response table includes ranks that are based on

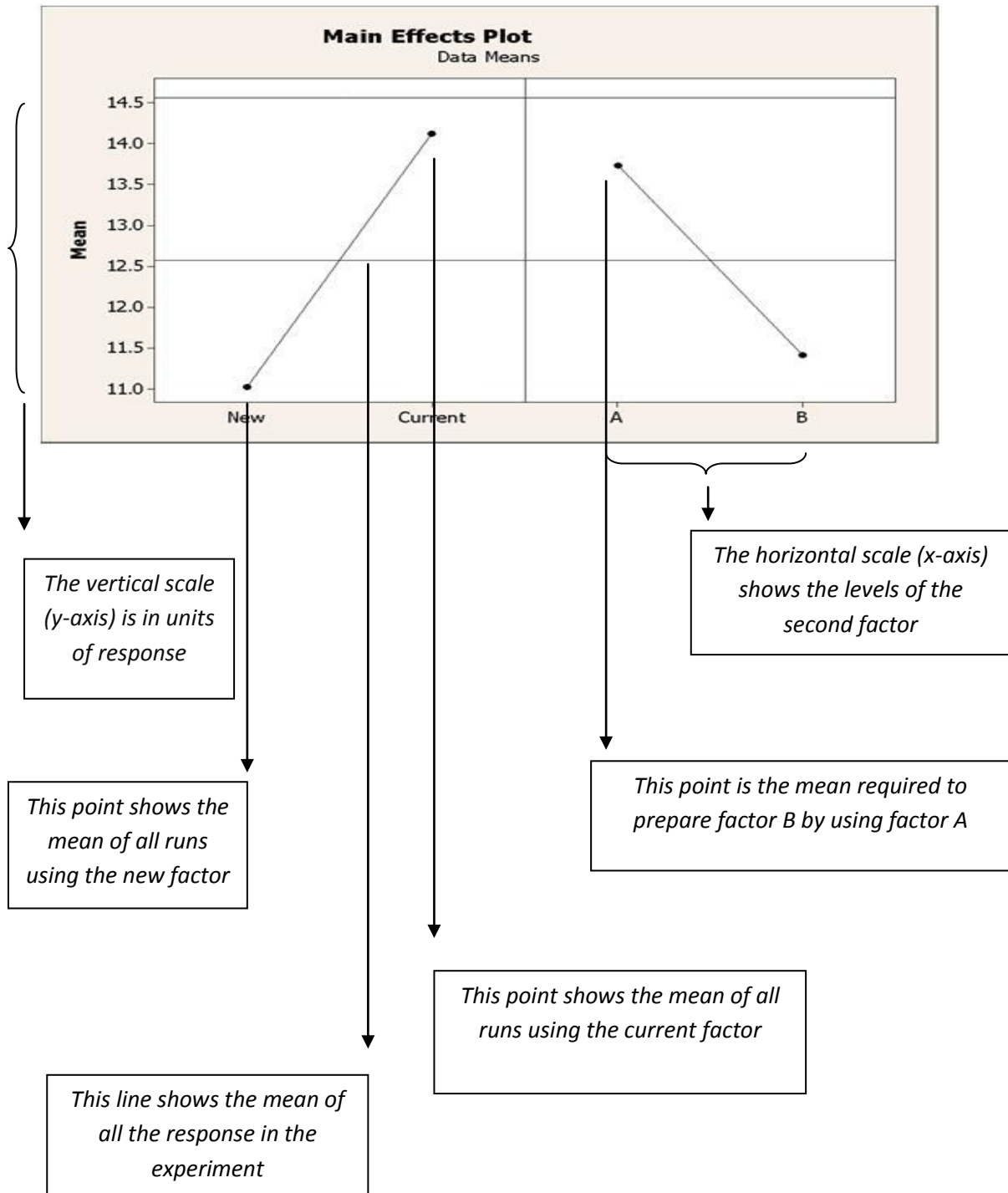
the Delta statistics which compare the relative magnitude of effects. The Delta statistics is the highest average for each factor minus the lowest average for each factor. The ranks are assigned based on Delta values, so rank 1 is assigned to the highest Delta value, rank 2 to the second and so on. The response table and the main effects plots for the signal-to-noise (S/N) ratios provide information for the factors which have the greatest effect on the S/N ratio and in this case is 'larger-is-better' regarding the customer satisfaction. The factor with the biggest impact on the S/N ratio is Application Processing (Delta=4, 54, Rank=1). Also by observing the response table it is obvious that the next factor is the Vendor Networking with similar S/N ratio (Delta=4, 15, Rank=2). The main effects plot provides a graph of the averages in the response table.



Graph 3: Customer Satisfaction

The plot shows the effects that caused by occupying the Personnel (P1, P2, and P3), the Vendor Network (V1, V2, and Branches), the new versus the current application processing and the selection criteria. The graph 3 shows the group of responses, regarding the customer satisfaction.

Definition of the graph:



6. Discussions, Conclusions, Recommendations

6.1 Discussions

The improvement of the process is a project which is monitored, controlled and evaluated from the Project Management Office of the financial institution. The desirable goal of improvement targets the growth of the customer base. The process is close related with three major factors. The lead time, the back office reconciliation and investigation process and the customer satisfaction.

PERSONNEL	VENDOR NETWORK	APPLICATION PROCESSING	SELECTION CRITERIA	Lead Time	Back Office Reconsiliation & Investigation Process	Customer Satisfaction
P1	B	Current	X	2	2	7
P1	V1	D	1000	3	2	6
P1	V2	Dp	45000	2	4	8
P2	B	D	45000	4	2	8
P2	V1	Dp	X	3	4	7
P2	V2	Current	1000	2	3	3
P3	B	Dp	1000	2	2	9
P3	V1	Current	45000	4	2	5
P3	V2	D	X	3	4	5

Table 12 Factors and received ranking

The rankings as the above table presents are not same for all factors therefore the desirable results can not be achieved.

- ❖ *Customer satisfaction*: 1 to 10 is the rank that presents the customer satisfaction. Most of the customers are satisfied with the final outcome of the process (the rank is from 5 to 9). The higher management targets, through the improvement of the process, to offer the highest quality in the final outcome. The target is the rank 10 which is equal with the delight customer.

- ❖ *Lead time*: 2 to 4 days is the lead working time for final approval or reject status of the credit card application.
- ❖ *Back office Reconciliation & Investigation process*: 2 to 4 are the working days that the process need for the evaluation of the credit card application.

The working days for both lead time and back office reconciliation and investigation process remain in the same levels.

The implementation of the Taguchi's Design of Experiment (DoE) had as a primary goal to present the main effects of these factors to the process and how these weaknesses can be minimized or eliminated. The use of a dynamic response experiment is to analyze and improve the functional relationship between the input signal and the output response. The quality characteristics of the signal factors that were used have different range of values which are depending on inputs of the system.

Inputs and values:

- ❖ *Personnel*: P1,P2,P3
- ❖ *Vendor Network*: B,V1,V2
- ❖ *Application Processing*: Current,D,Dp
- ❖ *Selection Criteria*: X,1000,45000

The response tables show the average of the selected characteristics for each level of the factors. The ranks that are included on the response table are based on Delta statistics which compare the relative magnitude of effects.

6.2 Conclusions

Taguchi Design of Experiment (DoE) gives the ability to evaluate several factors in a minimum number of tests. Thus it is achieved:

- i. Better understanding of the factors
- ii. Quantitative understanding of the factors
- iii. Influence of one factor on the others.
- iv. Optimal combination of various factors to reduce variation

Efficient experimental design helps to optimize the process and determine factors that influence variability. Factorial designs are easy to construct, but can be impractically large. Taguchi and random designs often perform better depending on size and assumptions. By running a Taguchi experiment and examine the response tables and the main effects plots, can be determined which factor settings must have a robust design.

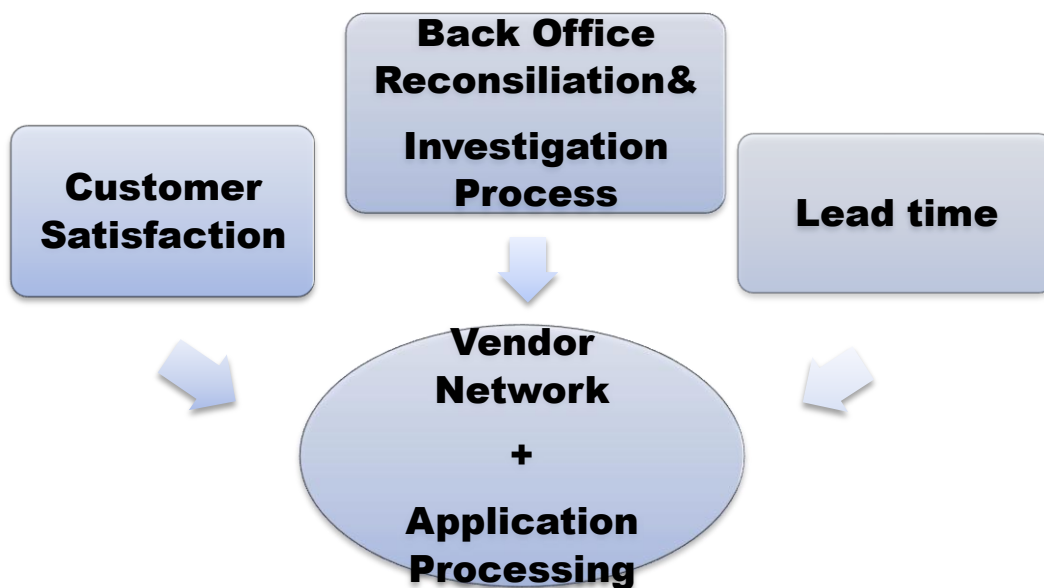
Through the analysis of the rankings on lead time the factor with the biggest impact on the S/N ratio is Vendor Network ($\Delta=3,181$, $Rank=1$). Also by observing the response table it is obvious that the next factor is the Application Processing with similar S/N ratio ($\Delta=3,181$, $Rank=2$). Therefore Vendor Network and the Application processing must be improved in order to achieve the minimum of the lead time since 'smaller-is-the better'.

Through the analysis of the rankings on back office reconciliation and investigation process the factor with the biggest impact on the S/N ratio is Vendor Network ($\Delta=5,1888$, $Rank=1$). Also by observing the response table it is obvious that the next factors are the Application Processing and Selection Criteria with similar S/N ratios ($\Delta=2,840$, $Ranks=2,5$). Therefore

Vendor Network, Application processing and Selection criteria must be improved in order to minimize the working days since 'smaller-is-the better'

Through the analysis of the rankings on customer satisfaction the factor with the biggest impact on the S/N ratio is Application Processing ($\Delta=4,54$, Rank=1). Also by observing the response table it is obvious that the next factor is the Vendor Networking with similar S/N ratio ($\Delta=4,15$, Rank=2). Therefore Application processing and Vendor networking must be improved in order to maximize the customer satisfaction since 'larger-is-better'.

The factors pointed from the analysis are the same for lead time, back office reconciliation and investigation process and customer satisfaction. The Vendor Network as well as the Application Processing have the highest rankings that indicate improvement. From the S/N ratios the influence of one factor to the other or others can be quantitative and thus can be better understandable.



Graph 4: Factors Interaction

The techniques that already used can reduce variability of the factors without eliminating the causes of variation. The Design of Experiment (DoE) approach can be applied, and is most effective, in experiments with multiple factors (ex. Vendor Network, Application Processing and Selection Criteria).

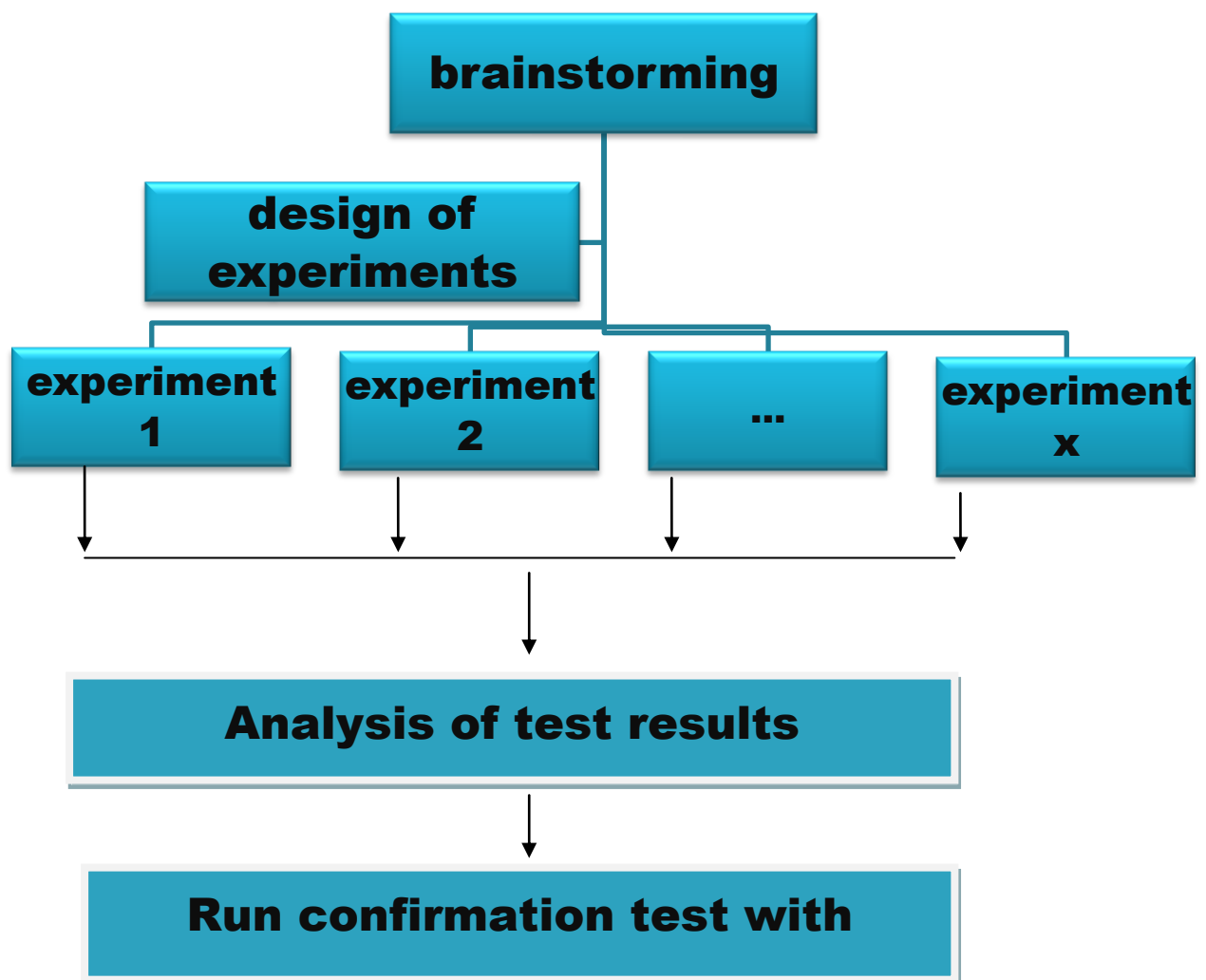


Figure 11: A Taguchi experiment flow diagram (Ranjit Roy, *A Primer on the Taguchi Method*).

6.3 Recommendations

Total Quality Management was implemented with success in the manufacturing and seems that this success will continue in the service industry too. Total Quality Management as cultural change aiming to cost reduction, creativity from employees and high quality deliverable in order to satisfy customers either internal or external. The service quality standards in banking sector need to be set logically. Total Quality Management tools focused on customer's satisfaction measurements.

The application of the quality tool in the process revealed critical results. The lead time, the back office reconciliation and investigation process and the customer satisfaction are close related with the Vendor Network and the Application Processing. These two factors ought to be re-organized and re-evaluated for providing the best outcomes.

The following key points, according to author, presented as the most important regarding the vendor network. Therefore:

- ❖ The vendor network ought to have accurate specifications of the service that will deliver. The detailed specifications can prevent inappropriate deliverables.
- ❖ A vendor network compliance manual should be in use for defining the service that arrives from vendor as it should agreed.
- ❖ Good vendor network relationships ought to be established. A mutual communication plan can define and set the goals of the vendor network.
- ❖ The use of vendor network scorecards. The development of a scorecard is to measure the Vendor's performance. The results

received from scorecards determine the level of inspection to the vendor network.

- ❖ Implementation and conduction of a vendor network quality control program. The quality control program can keep overall cost in line and provide long term customer satisfaction.

The Application Processing of the credit card business is a complex undertaking. Any actions regarding the improvement of the Application Processing ought to be planned with discipline. Key elements that may be considered vital for improvement are:

- ❖ Implementation of IT infrastructure that supports the daily production. The computer based activities regarding the application process may minimize the lead time.
- ❖ The use of application templates that are computer adaptable e.x. ICR templates (Intelligent Characteristics Recognition) can also minimize the working time of the process.
- ❖ Eliminate unnecessary documentation. Many applicants have to present documents that are not appropriate for the application process. A control system can be established to reject the appropriate documentation.
- ❖ Initiate turn around time (TAT) tools that will provide information regarding the time of the application processing.

Concluding the author's main intention is to present Taguchi's Design of Experiment (DoE) application, in projects related with financial service industry, as a pioneer quality management concept that targets customer satisfaction.

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