NEAR EAST UNIVERSITY
INSTITUTE OF GRADUATE STUDIES
BUSINESS ADMINISTRATION PROGRAMME

TECHNOLOGY MANAGEMENT AND TOTAL QUALITY MANAGEMENT AN EFFECTIVE TOOLS TO ENHANCE THE OPERATIONAL PERFORMANCE CASE STUDY ON EUTELSAT CORPORATION

MOHANNAD AHMAD YOUSEF ALDMOUR

MASTER'S THESIS

NICOSIA
2021

TECHNOLOGY MANAGEMENT AND TOTAL QUALITY MANAGEMENT AN EFFECTIVE TOOLS TO ENHANCE THE OPERATIONAL PERFORMANCE CASE STUDY ON EUTELSAT CORPORATION

MOHANNAD AHMAD YOUSEF ALDMOUR

NEAR EAST UNIVERSITY INSTITUTE OF GRADUATE STUDIES
BUSINESS ADMINISTRATION PROGRAMME

MASTER'S THESIS

THESIS SUPERVISOR
PROF. DR. ŞERIFE EYÜPOĞLU

NICOSIA
2021

ACCEPTANCE/APPROVAL

We as the jury members certify the ’ Technology Management And Total Quality Management An Effective Tools To Enhance The Operational Performance - Case Study On EUTELSAT Corporation’ prepared by Mohannad Ahmad Yousef ALDMOUR defended on 22/1/2021 has been found satisfactory for the award of the degree of Master.

JURY MEMBERS

.....

Prof. Dr. Şerife ZİHNİ EYÜPOĞLU (Supervisor)
Near East Unıversıty, Faculty Of Economics and Administrative Sciences
Department of Busıness Administration

.....

Asst. Prof. Dr. Kemal Çek

Near East University
Institute of graduate studies

.....

Dr. Karen Howells

Near East University
Institute of graduate studies

.....

Prof. Dr. Hüsnü Can BAŞER
Director of the Institute of Graduate Studie

DECLARATION

I Mohannad Ahmad Yousef ALDMOUR, hereby declare that this dissertation entitled ‘Technology Management And Total Quality Management An Effective Tools To Enhance The Operational Performance - Case Study On Eutelsat Corporation’ has been prepared myself under the guidance and supervision of ‘Prof. Dr. Şerife Eyüpoğlu’ in partial fulfillment of the Near East University, Graduate School of Social Sciences regulations and does not to the best of my knowledge breach any Law of Copyrights and has been tested for plagiarism and a copy of the result can be found in the Thesis.

- The full extent of my Thesis can be accessible from anywhere.
- My Thesis can only be accessible from Near East University.
- My Thesis cannot be accessible for two (2) years. If I do not apply for an extension at the end of this period, the full extent of my Thesis will be accessible from anywhere.

Date: 22/2/2021
Signature
Mohannad Aldmour

ACKNOWLEDGMENTS

This thesis would not have been possible without the help, support, and patience of my principal supervisor, my deepest gratitude goes to Assoc. Prof. Dr. Şerife Zihni Eyüpoğlu for her constant encouragement and guidance. She has walked me through all the stages of the writing of my thesis. Without her consistent and illuminating instruction, this thesis could not have reached its present.

Above all, my unlimited thanks and heartfelt love would be dedicated to my dearest family for their loyalty and their great confidence in me. I'm greatly indebted to my parents who are indeed my inspiration and the man who led me to the treasures of knowledge of my father. Along with, my mom who I would like to thank for giving me support, encouragement and constant love have sustained me throughout my life. Also, I would like to thank my wife Waed for her support and great patience at all times.

Eventually, there is a long list of friends that I would like to thank. I can't mention them all but I would like to thank them from all my heart for their valuable help and support since I was in my early study until now.

ABSTRACT

TECHNOLOGY MANAGEMENT AND TOTAL QUALITY MANAGEMENT AN EFFECTIVE TOOLS TO ENHANCE THE OPERATIONAL PERFORMANCE CASE STUDY ON EUTELSAT CORPORATION

This study aims to discover the technology management and total quality management as effective tools to enhance the operational performance case study on EUTELSAT Corporation. **Method:** The researcher uses Descriptive and quantitative analysis methods. Whereas, the data collected by using a well-structured questionnaire and applying it to a random sample of EUTELSAT Corporation, which consisted of three sub-dimensions (Total Quality Management, technology management, and operational performance) and (52) questions based on the systematic variation of the study variables. Whereas, the selected sample size consists of (119) employees who work as CEOs VPs, directors, managers, team leaders, and supervisors, in the case study on EUTELSAT Corporation. While the **results** showed that both of the technology management and total quality management an effective tools to enhance the operational performance of EUTELSAT Corporation (as the main dimension) was perceived by the study sample to be present with a mean of 3.97 (SD=0.75) at a high level. On other hand, the most important result was that the operational performance of EUTELSAT Corporation is showing that EUTELSAT Corporation's management pays great attention to improving TQM and technological management on the company's operational performance. **Conclusion:** The most important conclusion it’s confirmed that has validity for technology management and total quality management, which are effective tools to enhance the operational performance, This will lead to generating an integrated framework for Technology Management and TQM practices towards the improvement of operational performance.

Keywords: Technology Management, Total Quality management, operational Performance.

ÖZ

TEKNOLOJİ YÖNETİMİ VE TOPLAM KALİTE YÖNETİMİ EUTELSAT ŞİRKETİ ÜZERİNDEKİ OPERASYONEL PERFORMANS ÖRNEĞİ ÇALIŞMASINI ARTIRMAK İÇİN ETKİLİ BİR ARAÇ

Bu çalışma, teknoloji yönetimi ve toplam kalite yönetimi EUTELSAT şirketi üzerindeki operasyonel performans vaka çalışmasını geliştirmek için etkili bir araç olarak keşfetmeyi amaçlamaktadır. **YÖNTEM**: Araştrmacı tanımlayıcı ve nicel analiz yöntemlerini kullanır. İyi yapılandırılmış bir anket kullanılarak toplanan veriler ise, üç alt boyuttan (Toplam Kalite Yönetimi, teknoloji yönetimi ve operasyonel performans) ve (52) sorudan oluşan EUTELSAT Corporation'ın rastgele bir örneğine uygulanarak toplanmıştır çalışma değişkenlerinin sistematik varyasyonu. EUTELSAT Corporation ile ilgili vaka çalışmasında, seçilen örneklem büyüklüğü CEO VP'leri, direktörler, yöneticiler, ekip liderleri ve amirler olarak çalışan (119) çalışandan oluşmaktadır. **Sonuçlar,** teknoloji yönetimi ve toplam kalite yönetiminin toplamının EUTELSAT Corporation'ın (ana boyut olarak) operasyonel performansını artırmak için etkili bir araç olduğunu gösterirken, çalışma örneklemi tarafından ortalama 3,97 (SD = 0,75) yüksek seviyede. Öte yandan, en önemli sonuç, EUTELSAT Corporation'ın operasyonel performansının, EUTELSAT Corporation yönetiminin şirketin operasyonel performansında TKY ve teknolojik yönetimin iyileştirilmesine büyük önem verdiğini göstermesidir. **Sonuç:** En önemli sonuç, EUTELSAT'taki operasyonel performansı artırmak için etkili araçlar olan teknoloji yönetimi ve toplam kalite yönetimi için geçerliliğe sahip olduğu doğrulanmıştır. Bu, operasyonel performansın iyileştirilmesine yönelik Teknoloji Yönetimi ve TOM uygulamaları için entegre bir çerçeve oluşturmaya yol açacaktır.

Anahtar Kelimeler: Teknoloji Yönetimi, Toplam Kalite yönetimi, operasyonel Performans

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

Acronyms/ Abbreviations	Stands for
TM	Technology Management
TQM	Total Quality Management
OP	Operational Performance
ICT	Information and Communication Technology
MBNQA	Malcolm Baldrige National Quality Award,

CHAPTER 1
INTRODUCTION

Technology management is used to adapt to changing environmental conditions and technological advances as well as to create these transformations, based on the theory of dynamic capabilities.

The previous few decades have seen the development of the utilization of Information and Communication Technology (ICT) as a system for improvement and development in several countries (Bankole et al., 2015), Contemporary technology and the information revolution through its advanced means have a large and wide impact that encompasses various aspects of life. Which is indispensable to the individual society and organization. The rapid growth witnessed by the world in various fields of technology, software, computers, and communications has made organizations of different work and characteristics to the challenge of catching up with this tremendous technological and informational progress, to ensure success, continuity, and efficiency in achieving better performance to ensure optimal utilization of available resources.

Whereas “technology” as a term is an expansive concept, some consider it as patents or trademark, others consider it as techniques advertising, management, or manufacturing, and some conceive it in terms of products or machinery. Technology Management is the integration between human know-how, equipment, technical skills, technology process, marketing, and management. (Antony, Leung, and Knowles, 2002).

These days with the highly globalized and innovatively propelled world, the organizations or countries with old technological innovation, poor administration of innovation, the old state of mind, and out of date creation process can't exist in profoundly aggressive globalize economy. (Antony, Leung, and Knowles, 2002).

Organizations having cutting edge innovation however inadequate with regards to the capable specialized aptitudes, required learning, and limit, and poor administration of innovation is useless. It's the administration of innovation that makes benefit, not simply innovation. Innovation may likewise allude as center innovation (fabricating process), high innovation (PC based innovation as microelectronics, robotics, and satellite industry. (Antony, Leung, and Knowles, 2002)

This thesis intends to stimulate the exchange of ideas and new initiatives for innovation and technology Management in the satellite and telecommunication industry.

1.1 Study Problem Statement

Business organizations face many challenges that necessitate the use of modern and innovative methods, mechanisms, and strategies to cope with the emerging phenomena of innovation technology. Competition between these organizations is increasing due to several factors, including traditional ones arising from the nature of work in these organizations, Modernization As a result of globalization and tremendous advances in the information and telecommunication sector. Accordingly, an effective organization right now can build up its services and products to react to the requirement and needs of clients. In all these cases, Technology has become an essential extent of the success of organizations to survive, grow, and compete to continue the market. (Brah, Wong, and Rao, 2000)

1.2 Study Questions

The study tries to answer the main question which is: Have Technology Management and Total Quality Management been Effective Tools to

Enhance Operational Performance? The question of the study has divided into the following sub-questions

1. What is the role can Technology Management plays to improve performance?

2. What is the role can Total Quality Management plays to improve performance?

1.3 Study Objectives

The main objective of the study is to show the influence of Technology Management and Total Quality Management as a compelling instrument in the competitive markets and on the operational exhibition, likewise to test and analyze the Total Quality Management, TQM and the role of expanding the firm's performance, additionally contributes to overcoming any gap between technology management and TQM. And to determine:

1. Exploring the degree of development and innovation technology management in business firms.

2. Exploring the level of competitive advantage in business organizations.

3. Exploring the role of Technology management as an active tool to expand the operational performance.

4. Revealing the role of Total Quality Management as a dynamic tool to expand operational performance.

1.4 Importance of the Study

The importance of this study rises from the following; (Brah, Wong, and Rao, 2000)

1. The significance of Technology Management (TM) and Total Quality Management (TQM) currently is the strength and excellence of driving business organizations.

2. Global competition has affected all economic, social, and administrative organizations because of the rapid spread of innovative technology. It is therefore very important that organizations focus today on achieving competitive advantage to ensure their survival in the market.

3. The needs to change the traditional management methods in business organizations to ensure their survival

4. The novelty of the topic as it links between variables of great importance at present and given the many advantages that the application gives to the management of the Technology Management (TM) and Total Quality Management (TQM) through the follow-up and follow-up of the Organization to technological developments.

5. Strengthen the competitive organizations' capacities and increase their market share.

6. This topic is a new addition, contributing to enriching the knowledge field and supporting researchers and interested in carrying out new studies in such subjects."

7. "Lack of applied studies that dealt with the Technology Management (TM) and Total Quality Management (TQM) from this aspect."

Study Conceptual framework (model)

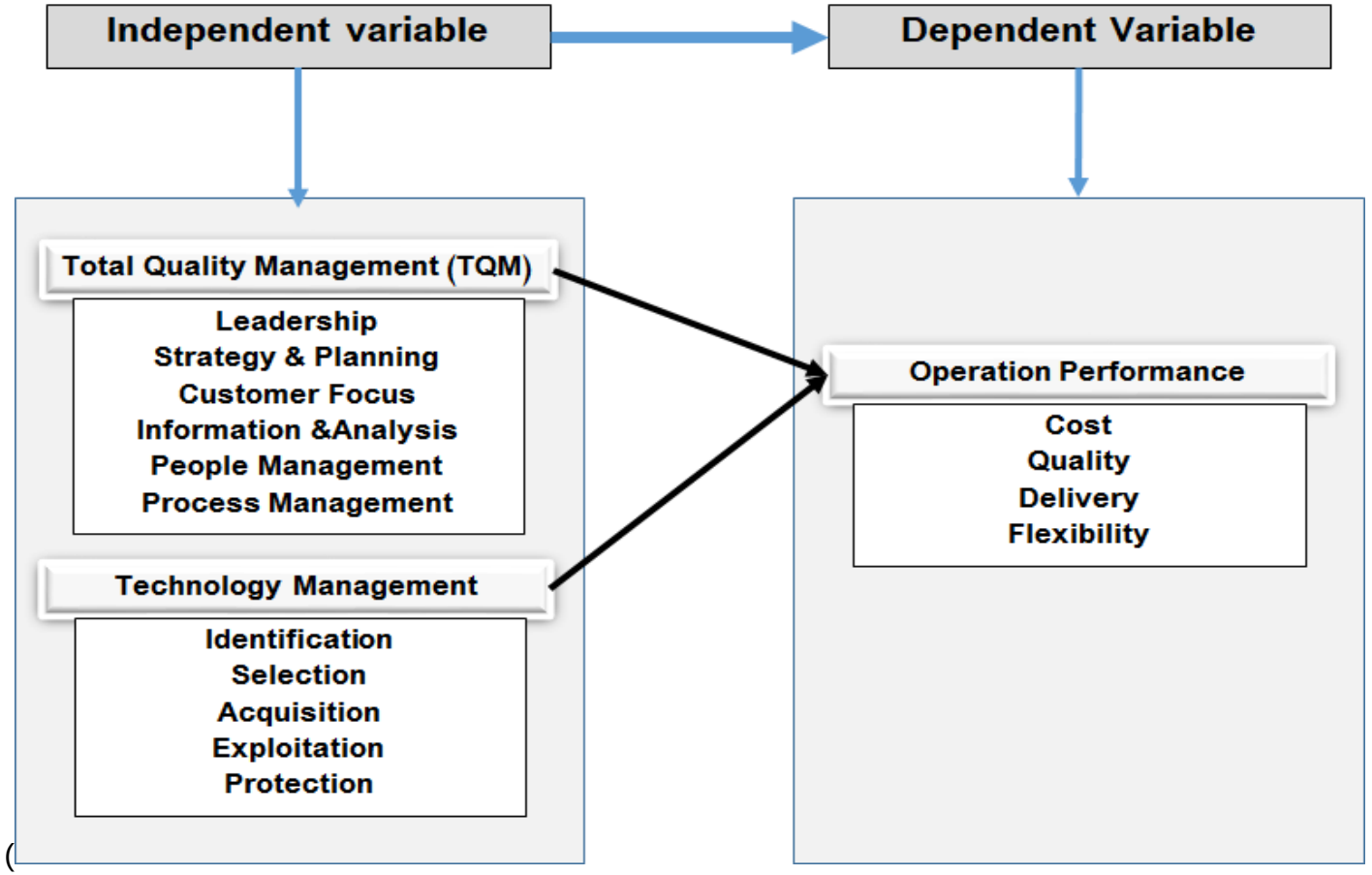


Figure 0.1: Conceptual framework (model)

1.5 Study hypotheses

Researcher has been building the study hypotheses depending on the problem of study and different elements so that the study hypotheses are timely answers. It will be clear from the applied side the possibility of refusal or acceptance.

This study continues to build assumptions by analyzing and revealing the relationships between Technology Management (TM) which are expressed in a set of variables on the one hand, and Total Quality Management (TQM) and its variables. On the other hand which applies to operational performance (OP). This is the basis of the study in terms of the method and procedures to cover one level of analysis as below:

“Analysis and detection of impact relations between the independent variable, interest in Technology Management (TM), and Total Quality Management (TQM) (study sample), On the one hand, and between the dependent variable (operational performance) variables”

1. **Dependent Variable**

   Operation performance is the dependent variable in this study, four major factors will be handled as an operational performance which is, Cost, Flexibility, Speed, and Quality

2. **Independent Variable**

   Technology Management (TM) and Total Quality Management (TQM) are independent variables, each with a range of practices. (Phaal et al., 2001) classifies technology management practices (TM) as identification, selection, acquisition, exploitation, and protection. These practices have been tested under the TM variable."

   Malcolm Baldrige National Quality Award, (MBNQA) builds standards for Total Quality Management (TQM) which are process

management, people management, customer focus, information and analysis, planning and strategy, and leadership.

The Analysis aims to check hypotheses of TM and TQM in operational performance. Hence adopted the approach way analysis, where the study hypotheses distributed as follows:

***H_{01}*:** TM practices have a significant impact on operational performance

***H_{02}*:** TQM practices have a significant impact on operational performance

1.6 Study Limitations

The limitations of this study are categorized and listed as follows:

1- **Human Limitations:** The study population is confined to the Technology Management' and Total Quality Management an effective tool to enhance the Operational Performance, from a convenience sample of (119) on EUTELSAT Corporation. The study also analysis perceptual data, given by quality and operations managers, which may not provide clear degree of visual quality to customers.

2- **Time Limitations:** The current study was conducted in the 1st term of the academic year 2019 / 2020.

3- **Geographic Limitations:** Geographically, the current study was restricted to EUTELSAT Corporation.

1.7 Terms of the Study

Total Quality Management It is defined as a 'dedicated efforts to provide an ever-increasing level of quality to retain attention and repeat business for your customers. Large companies around the world are practiced by constantly checking their services and products by using the practice of comprehensive TQM to improve

the competitiveness, giving special attention to their core customer base'.

Performance :It is defined as measuring the completion of a specific task against predefined standards of accuracy, completeness, cost, and speed. In the contract, performance is considered as the fulfillment of an obligation, in a way that frees the performer from all obligations under the contract (BusinessDictionary.com, 2020).

Operational performance is defined as "a measurement of a company's performance against a defined standard or indicators of effectiveness, efficiency and environmental responsibility such as time-cycle, productivity, waste minimization, and regulatory compliance (BusinessDictionary.com, 2020).

1.8 Study Population

The study population consisted of all CEOs VPs, directors, managers, team leaders, and supervisors of EUTELSAT which is equal to (171) Working in the EUTELSAT's Corporation head office and different branches in different countries,

EUTELSAT was born from the ambition to build a European industry in the manufacture, launch, and operation of satellites. Eutelsat was established in France under French law, with the main office located in Paris.

The early years (1977 ~1989)

The organization was first formed in 1977 to operate the first generation of communications satellites requested by the European Space Agency (ESA) with 12 employees.

Growing up (1990 ~ 2001)

After the fall of the Berlin Wall, the original scope of Eutelsat changed. The organization's membership expanded eastward from the early 1990s to combine all Eastern European countries. New

satellites offering higher capacity and a wider geographic range were launched during this period. The satellite TV market expanded rapidly, leading to the transformation into Digital in the middle of the decade paving the way for the launch of multi-channel pay-TV platforms across Europe.

Going global and going public (2001 ~ 2010)

With the liberalization of the telecom sector, EUTELSAT was transformed into a private company in July 2001 and went public in 2005. Eutelsat's activities diversified rapidly in the first decade of the twenty-first century to include internet services and government.

The broadcast business has continued to expand with the HOTBIRD satellite concept for frequent broadcasting to other locations to address markets in Russia, the Middle East, Turkey, and Africa.

Geographical attain persisted to expand through Africa, Asia, and the Americas. Within the decade, offices were opened in major European centers also in Asia and the two Americas. Two Teleports in France and Italy were also established to provide broadcast and broadband services.

Eutelsat's business

EUTELSAT is one of the largest satellite operators over the world, it has 39 satellites that serves 150 countries in Europe, Asia Americas, and Africa.

Through its satellites, it provides a service of broadcasting video channels, telecom operation, and government agencies services.

Market leadership and an exciting future (2010 ~ today)

EUTELSAT, today is one of the most innovative operators in the satellite business. By acquiring SATMEX in January 2014, the group now provides capacity on 39 satellites providing premium

coverage for Europe, Africa, the Middle East, Asia, and the Americas. ”

A technical support team of more than 1,000 industry professionals from 46 countries is present in offices and immediate outlets around the world, ensuring that we are close to our customers to provide the highest quality of service.

Our continued growth is the result of a strategy focused on three main pillars: strengthening our leadership position in Europe and expanding our presence around the world; targeting the development of digital services in the video market as well as in the data and communication markets; and investing and innovating to renew our fleet of satellites and develop new applications and services.

Since its humble beginnings 40 years ago, EUTELSAT has been at the heart of the global satellite industry and the vibrant digital economy.”

CHAPTER 2
LITERATURE REVIEW

2.1 Overview

The literature review will concentrate on the principal territories of study which are Technology Management (TM) and Total Quality Management (TQM) and Operations Performance (OP).

With regards to the Technology Management (TM) and Total Quality Management (TQM), there were studied as a part of the practices of the organization, but the Operation Performance (OP) was studied as part of the organizational performance (Gudanowska, 2017).

2.2 Operation Performance

Distant as well regularly, organizations are utilizing the off-base toolset to the degree their activities and fall flat to recognize that the extreme objective of performance management is to empower brilliantly business decisions. Performance management instruments ought to particularly and precisely gauge parameters related to business strategy and objectives such as efficiency and productivity. These parameters must be significant by the line of business leaders and managers, as well as be reliably and dispassionately measured (Gudanowska, 2017).

Operational Performance Management (OPM) is the course of action of all specialized units within an organization to ensure their cooperation to achieve the interior's goals for the business. OPM allows organizations of all sizes to set up joins between operational KPIs and basic business measurements. This incorporates any sort of activities included in keeping

a business running beneficially. Organizations have special operations – each of which is dependent on reliable and on-time data to capitalize on proficiency (Gudanowska, 2017).

2.3 Objectives of operational performance

These objectives are the areas of operating performance that the organization tends to improve, in the effort to achieve its corporate strategy. Once the corporate strategy defined, the company will define the objectives of the operational performance related to measuring and configuring the environment, to enable achieving it (Slack et al., 2007).

As Neely (2011); and Slack et al. (2007) pointed out in which they demonstrate five basic objectives for implementing activities that allow organizations to determine the presence of their functions. The demonstration destinations are quality, speed, reliability, adaptability, and cost. Each of these other objectives will be examined in terms of how they are significant to organizational competitiveness.

2.4 The Speed Objective

The speed objective determines how quickly an organization can present the products and create quotations for sales. These objectives will concern themselves with issues such as the time needed to produce and process one or more of the company's products or the time needed to search and develop a new product (Slack et al., 2007).

2.4.1 Product Quality

Quality is usually taken into consideration to estimate how well the product complies with a particular specification. As of Neely (2011), It is also anticipated how easy it is to maintain, how durable and reliable it is, how the product’s features are, How well does it do its intended function, and what is the customers believes in its value, All of these are related to its measures.

2.4.2 Costs Variation

This objective examines the amount of variation in the unit cost of the product and is measured by changes of many of factors, including size and product diversity. Products with greater diversity tend to use smaller volumes, greater unit costs, and vice versa. Eventually, it will affect the product price, its production costs, and the profits that can be obtained from this product (Slack et al., 2007).

Cost and volume Objectives tend to focus on:

- Productivity and proficiency (for example units every week or representative)
- Unit costs per element
- Involvement per unit
- Several things to be produced (per period, machine, and so on.)

2.4.3 Operational Flexibility

Flexibility in the operations is the processes that can shape production lines to deal with extraordinary requirements and as well quick adjust those production lines with new requirements.

Flexibility is much related to the objective of speed. The company must be able to develop different varieties of high-quality products as well as to adapt its operations to cope with the conditions of the markets and delivery schedules (Neely, 2011).

Related objectives include:

- Workers efficiency: for example output per representative, units delivered per creation line; deals per shop,
- Output per period: for example, potential output per week based on normal shifts; Potential output assuming certain levels of capacity utilization,
- Capacity utilization: percentage of potential output being

achieved,

- Application deadline: for example, the time elapsed between receiving and processing the request.

2.5 Reliability of Operational Performance

This objective is to evaluate the reliability of the company in regards to the products delivery on time to the customers, based on prices and costs planned. The ability of the product to consistently operate in an acceptable period is also a measure of reliability (Neely, 2011).

2.6 Operation Performance Measurement Techniques

According to Schmidle (2011), techniques are used to measure operational performance.

Operational performance measurements are the key metrics used to measure a company's operational performance. Different companies have different metrics to measure their performance, but few common metrics speak of the entire business environment. One of the main tasks in this process is to identify appropriate performance measures that are relevant to internal and external factors related to the organization's competitiveness.

2.6.1 Productivity

Productivity is how effectively an employee, a machine, a factory, a system, etc., can convert resources into useful outputs. It is calculated by dividing average production for a period by the total cost incurred or resources (energy, capital, , materials, and employees) that used in that period. Therefore, Productivity is an important factor in determining cost efficiency.

2.6.2 Quality

Accomplishing or exceeding the necessary degree of quality is likewise fundamental for a fruitful business. There are numerous methods of estimating the accomplishment of “quality ", which include the following:

- Scrap/defect rates: a scale of inferior quality,
- Reliability - how often a mistake occurs; average lifetime use etc,
- Customer satisfaction – measured through customer investigation,
- Number/occurrence of customer complaints,
- Customer loyalty - for example, the percentage of business frequency.

Timeliness:

Generally, compliance with contract dates is a guarantee as a transverse point and not a central point such as the condition. Therefore, failure to comply with the schedule may amount to a breach of warranty (for which the injured party may sue for damages) and not a breach of the terms (the affected party may terminate the contract for it). If a schedule is vital, it must be made a specific condition using precise formulation such as the traditional phrase, "Time is essential").

Cycle Time:

The period required to complete a single run cycle, or to complete a job, task, or task from start to finish. Whereas cycle time is used to differentiate between the total duration of the process and the time of operation.

Utilization of Resources

To insure that resources are appropriately allotted to operations, it is essential to record, monitor, and review aspects of operations performance.

Costs:

Whatever the competition is, the company must ensure that the processes are cost-effective. Whereas, the measure of cost-effectiveness is the "unit cost" which is the normal cost needed to produce one unit of the product.

Companies that compete in the same industry have almost similar cost structures, but the variation will be among the productivity, efficiency, or the volume of production. The business that has the lowest cost per unit has a stronger position to be competitive by being able to provide the lowest price or achieve the highest profit margin at the average industry price.

2.7 Previous studies on Operation Performance

According to the researcher and through the previous studies on the subject of the study was not able to access a number of these studies, which dealt with the dimensions of the Operation Performance. Here below are some of the previous studies that dealt to present the co-relations with Operation Performance. Flynn et al. (1995) considered the relationship between the operating performance and Quality Management (QM). Flynn, one of the pioneers who suggested improving operating performance through quality management practices. Moreover, Flynn has divided the practices of quality management into two groups: (1) Basic Quality Management Practices and (2) Infrastructure Quality Management Practices. After considering Flynn, many empirical studies were conducted and confirmed the significance of quality management practices in operational performance. Moreover, the studies received significant attention within the literature on the interacting between quality management practices and operating performance.

However, results from some previous studies have shown low consistency. Part of them in order to test the quality management and operating performance relationship have used the same dimensions but the results were different. For example, between performance and process management relationship, the direct effect of process management on performance has been demonstrated in several studies, "(Fening et al., 2008; Terziovski, 2006; Feng et al., 2006; Kaynak, 2003; Prajogo and Brown, 2004; Sila and Ebrahim pour, 2005; Zu, (2009)". However, as per Tari et al. (2007), they show that they have an indirect relationship. On the contrary, Flynn et al. (1995) argued that process management has a direct

negative effect on performance, despite if it is unrelated (Powell, 1995; Samson and Terzyovsky, 1999).

Whereas, Kaynak (2003) suggested that future research must consider the interaction between quality management practices that can indicate an indirect relationship between QM practices and OP.

As reported in these previous studies of Ahir and Oshonisi (1998), Anderson et al. (1995), Flynn et al. (1995), Kaynach (2003), Shane et al. (2000), the added value of high management is playing an important role in implementing quality management. By influencing another quality management practices, it can enhance operating performance. Instantly, to enhance the effectiveness of the quality date usage, the top management provides the necessary resources in collecting quality data and ensures that it is always available at workstations. Moreover, by supporting the display of quality data in employee workstation control charts, it will be easier to identify current problems in manufacturing processes. The upper management support relationship of the quality data with the reporting and analysis is well established in the literature (Flynn et al., 1995; Kaynak, 2003; Lakhal et al., 2006; Sila and Ebrahimpour, 2005).

According to the opinion of the researcher, most of the aforementioned studies dealt with the performance of the process along with other factors, along with the quality, and only a few studies can be found that dealt with the operational performance as a whole, while another study focuses on the performance of the process as a complete dependent variable. And some of them also deal with performance such as cost, quality, flexibility, and speed.

2.8 Technology Management (TM)

The increasing number of distributions related to technology management (TM) demonstrates the current importance of the field while knowledge papers remain uncommon with Technology Management (Cetindamar et al, 2006). For illustration, a recent work by Cetindamar et al. (2009a)

demonstrate the Venn diagram which is used to characterize the relationships between technology management (TM) and support for management disciplines (innovation management, knowledge management, and research and development management) as shown in the figure below. This figure appears to cover different disciplines but moreover, it highlights how Technology Management (TM) differs from others (Godanowska, 2017).

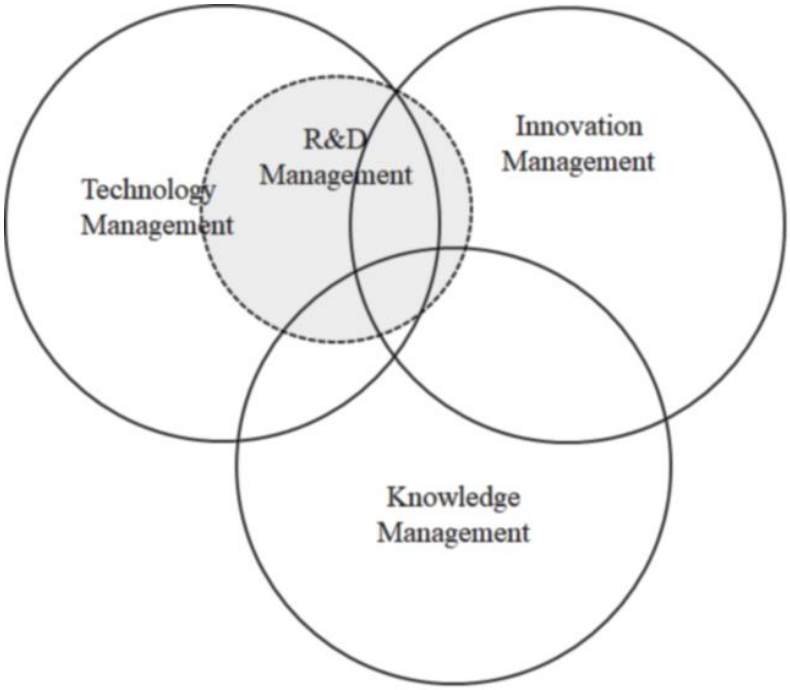


Figure 0-2: Technology Management and supporting Management Disciplines

Moreover, Michael (2004) defined technology management as involving a redundancy process that needs its own set of tools to manage it. Projects to exploit new technology must be fully organized and managed. If they fail to do so, it may lead to frustration and inefficiency. While technology management is not a single field, it is a relationship to more than one field that combines engineering, science, management knowledge, and practices (Michael, 2004).

The interest in technology management as a research area has grown enormously, especially within the past ten years, although it does indeed return to the 1950s. This interest has become a separate discipline with

the increase of professional organizations, like PICMET (Portland International Center for Engineering and Technology Management) and EITIM (European Institute for Technology and Innovation Management) (Citendamar, Phaal, and Robert, 2009).

According to Beyan and Cetindamar, the number of papers distributed on this topic between the years 1995-2005 grew by more than 160%, comparing to previous years since 1986. (Beyhan and Cetindamar, 2011)

In 1994, Cherky already pointed out that the management of technology, regardless of the need to perceive the future and current technology scope, together with the improvement of methods that increase the credibility of decisions related technologies, is one of the major research and practice areas of interest inside technological developments and advances (Cherky, 1994).

2.8 The Core of Technology Management

According to Łunarski, (1994) Technology management requires every activity within management that decide the application of policy, targets, and technological responsibility, as well as its implementation in the organization using means such as planning, resource assurance, organization, and guidance to develop and improve technology in application process. Technology management has also been defined by the Technology Management Task Force as a process that involves planning, developing, and implementing technological capabilities to shape and achieve the strategic and operational objectives of the organization (Phaal, Farrukh and Probert, 2001).

In this framework, the subject of technology management involves the technological capabilities of a specific organization which means a range of accessible technologies. This definition shows up frequently in literature (Phaal, Farrukh and Probert, 2004).

However, Cetindamar et al. (2009) claims that although it contains both the "hard" and "soft" Dimension of technology, it is a statistical framework

for the issue and fail to calculate the dynamic nature of the process. Besides, the author point out that technology management analysis requires the context of recording challenges and improvement opportunities for a new product made through technological advances, as well as industry differences (Cetindamar et al, 2009).

Gregory's (2004) perceptions the Technology Department has general operations within the context. Though Cetindamar et al (2009) has been described technology management as adaptation towards successful implementation, and particular activities (recorded in Table (2-1)) attempted to achieve and develop a high market position, based on the organization's targets.

Table (0-1): Activities of Technology Management Structure

Activates	**Short description**
Technologies Identification	Technologies of real or potential importance to the organization, including the search, control, collection, and processing of information
techniques Choice	Technologies that need decision-making, gone before by the identification of needs accepted by the organization at the vital level, which allow the transfer of particular technologies to the business methodology
Acquisition	Acquisition decisions indicate a choice between purchasing, collaborating, or implementing technology
Exploitation	Utilizing technologies to supply financial or any other improvement to the business
Protection (Securing**)**	Securing the information gained within the productions process
Learning (Teaching)	Learn the information coming from the development and abuse of technologies, where it was noted that there's a strong relationship to knowledge management within the organization

Yaseen (2005) defined protection as: “the system of activities that use networks”, whereas, ALOmary et. al. (2015) defined network as: “The ability of any organization to provide services and exchange information by using local network or internet within easy and low-cost method”

It should be noted that technology management mustn't be restricted to the management of a precise set of technologies, but should moreover develop a technique for its implementation on the supply side of accessible resources, on the technologies currently in use, on market future and thus the environment related to socio-economic issues" (Nazarko, 2016).

(Badawy, 1998), technology management stems from the hone of integrating a technological methodology into the company's business technique, an integration that requires logical coordination of R&D, as well as the company's marketing, financing, and human resources functioning.

Klincewicz (2010), who identified the areas of interest in which the researcher concentrate on technology management as follows (Klincewicz, 2010) :

1. Part of the development of new technology and its effect on current activities and organization improvement.
2. Identify threats and opportunities within the setting of the improvement of technologies, specifically developing ones
3. Decision-making in conducting and coordinating personal research and improvement activities as well as creating technological products.
4. Protecting the industrial and mental property of the enterprise."

According to research conducted by Cetindamar et al. (2009), the center points of interest of researchers managing with technology management are as follows:

1. Organization, culture, structure, terms of reference, knowledge, creativity, management idea.

2. Policy inside technology such as technology management policies and controls improvement systems within the national, territorial and sectorial framework

3. Acquisition, transfer, dissemination, and adaptation of technology.

2.9 Technology Management on the Operational Performance

Organizations do strategic decisions in a competitive market where technology development and technological processes are important for maintaining competitiveness levels. The most important strategic decisions challenging management in this global competitive environment is technological development (Jones, Lanctot and Teegen, 2001).

The more technological capabilities the company has, the faster the company has access to technology. According to HALICKA (2016) using other important complementary assets to provide companies with higher levels of internal diversity required to reshape the current business strategy.

Definitely, organizations have to have special technological assets to deal with the dynamics of the current enlightened society. Technology is therefore a strategic mechanism that improves communication, cooperation, and knowledge and information exchange through the presence of assets or tools that increase the flow of knowledge and information more quickly and more easily in the organization. This study will analyze the importance of the technological assets referred to above to contribute to the literature on technological knowledge (Beard, 2002).

Further, Technological assets are increasingly encouraging the carrying capacity in firms to enable them to accomplish more goals on their own through organizational learning processes. Besides, the knowledge achieved by the company thanks to the more advanced carrying capacity enhances effective software products that support the integration of knowledge between individuals and processes within the firm and enable more flexibility and better adaptation of its organizational structure, which lead to enhance the organizational innovation in the organization to enhance the operating performance (Beard, 2002).

In fact, the operating strategy must be compatible with the technology strategy, in which, Prajogo & Sohal (2006) have studied technology management and linking it to product and process performance, and the study have concluded that technology management along with research and development have a significant impact on products innovation that will improve operational performance.

2.10 Previous studies on Technology Management

Here below some of the previous studies that handled the technology management perspective and related issues and techniques.

- A study conducted by Li-Hua (2008) Entitled with “Technology management in China: a global perspective and challenging issues”. It took changes in China's business environment using a technology management perspective. And designed the most important consideration needed to implement the tools of technology management to find all of the opportunities to improve the transfer of the technological skills and developments in China.

  The primary reason for this paper was to assert that globalization is starting to influence the business environment and to highlight the role of using management strategies to synergize the technological differences between East and West. It demonstrates the structure of MOT and intensely explores the technology

application and the development of innovation in China. It focuses on the most important factors that necessary to start and build the infrastructure, the mechanism, and the technology management tools in China.

The methodology used by the author here was based on the experience, paper research profile, and American research over the past 20 years.

The results of study findings which its emphases on the importance of MOT as a strategic element to sustain competitiveness, the author illustrated what is missing in the Chinese MOT to continue the development taking the US experience in MOT as a reference during the past decades despite the differences in the culture and business strategies.

The paper pinned out the need for proper infrastructure in China and Technological strategy at control the mechanism of the growth to come up with a model that supports the diffusion principles in MOT in China based on the Chinese culture, the level of education, and innovation. The study recommends the basic elements that have to be provided by the decision-makers to understand the gap in the technology management process and to implement the management tools to get a sustainable technology growing and technological transfer during the globalization of the Chinese firms.

- A study conducted by Yasemin (2006) entitled with "Determining key capabilities in technology management using fuzzy analytic hierarchy process: A case study of Turkey". This research aimed to explore the importance of technology management as an indispensable factor in achieving long-term achievements or disappointments for organizations in the world today. Because technology is a remarkable driver of global financial progress, Business specialists seek increasingly fruitful approaches to

supervise existing and rising technology. This study gives a model for a better understanding of the relationship between competitive advantage, competitive needs, and the firm's competencies in technology management. The researcher used the "hazy analytic hierarchy" (AHP) process to fragmentize this connection. In expansion, analysts assess the viewpoint of a bunch of managers from different Turkish companies concerning technology management.

This study suggests a model that recognizes the links between:

- ✓ Competitive advantages are classified as company growth, profit, and return on investment (**ROI**).
- ✓ Competitive priorities with key components such as time, quality, adaptability, price, and cost.
- ✓ The competencies have been listed as product technology, management technology, and finally enterprise process technology.

The essential result of this research is that the idea of technology management shows up to be more demanding than both product technology and process technology.

- A study by Gudanowska (2017) entitled "Modern Research Trends in Technology Management in Light of Selected Publications". This study intended to investigate the research trends in technology management, it focused on investigating the areas of research and all the issues connected with the TM.

Accordingly, this paper principally centers on exploring research regions and issues associated with technology management in contemporary logical distributions chosen, the results of the outlined lead to a visualization of issues most as often as possible happening in the configuration with technology management.

- A study by Carraher et al. (2006) entitled “Entrepreneurial service performance and technology management”, This research aims to identify the tool of choice in the process of predicting technological performance in technological business in China and Japan. The survey was distributed to 262 and 236 employees in china and japan respectively relating to the on-the-job performance. The result was different in both countries regarding the dimension of the technology-oriented organization, The analysis suggested that the discrepancy in service-oriented and technically oriented performance could be better explained in China than in Japan.

2.11 Summary of the Literature on TM and the Present Work

The current study differed as to the Li-Hua (2008), Which dealt with technology management in China: a global perspective and difficult issues and this show that there are needs for appropriate infrastructure in China and a technological strategy to control the growth mechanism to reach a model that supports the principles of spreading in the Ministry of Commerce in China based on Chinese culture, level of education and innovation. Yasmine (2006) also provides a model for a better understanding of the relationship between competitive advantage, competitive needs, and the firm's competency in technology management. Whereas Gudanowska (2017), shows that visualization of issues most as often as possible happening in the configuration with technology management. Furthermore, Joiner (2007, identifies the selection instrument in the process of predicting technological performance in the technological business in China and Japan. This study shows that there is a difference in both countries regarding the dimension of the technology-oriented organization.

Whereas, the current study versus all previous studies mentioned above explores technology management and total quality management as an effective tool for enhancing operational performance, to allow decision-makers to identify the positive and negative points of TM and TQM applied through the operational performance of Eutelsat.

2.12 Total Quality Management

TQM was presented conceptually in 1980 by W. Edwards Deming, Joseph Juran, and Kaoru Ishikawa (Hackman & Wagman, 1995). Whereas, Waldman (994) characterized it as an integrated organizational technique to enhance product and service quality."

2.12.1 TQM Concepts

“This type of management concentrate on the modern directed management concepts by merging the creative tools and the specialized professional tools to raise the performance level and achieve strong competitive classification”.

To apply the total quality management these required should take a place:

- **Super management supporting:** it’s important to make managers conviction to apply the total quality management system and make the required changes, by leading and supervising the general performance, directing the firm business, taking convenient decisions, and making effective plans. Samson and Terziovski, (1997) defined it as a set of decisions and procedures and mechanisms that the super management uses to evaluate and develop the general performance of the firm.

- **Concentrate on the consumer:** The main goal of implementing Total Quality Management is to achieve consumer satisfaction, by providing them with the products and services they need and increasing their desire for these products and services. (Hackman and Wageman, 1995) defined it as a set of procedures that the firm uses to apply to keep consumers and provide their requirements within these conditions: fast, low cost, and high quality. So the human resources at any firm should consider the consumer as a basic demand or the focus of

attention.

- **Teamwork:** basically the total quality management depends on teamwork. To solve problems by discussing all opinions and use each skill by activating the employees' role and allow the employees to put the goals and making decisions. (Antony, Leung, and Knowles, 2002) defined it as gathering all opinions to solve problems.
- **Searching and development:** the firms use searching and development to avoid any problems that may occur during the applying of long term plans, (Antony, Leung, and Knowles, 2002) defined it as a creative work according to scientists rules to increase the professional knowledge that will be used in a new application of production activity, by using statistical tools to measure the quality, discovering errors, and solve problems, by using Effective communication system inside the firm or with the other branches to receive the information the time.
- **Training:** any firm has to train the employees continuously, to develop the production process and increase the employee's skills and abilities. (Chen et. al., 2016) defined it as a mechanism to increase the employees' abilities by effective courses and training programs to build their teamwork spirit and creative thinking to achieve high qualified employees.

  It refers to common operations and management strategies that focus on the organizational platform including employees to enhance the products and services provided to the customer whose satisfaction it seeks. (Anthony, Young, and Knowles, 2002)

The Malcolm Baldrige National Quality Award (MBNQA) criteria were used to designate TQM practices along with operational performance, these criteria are: (Chen et. Al., 2016)

1. **Leadership:** is the art of guiding the employees to work toward a specific target. In a business environment, this can mean supporting

employees and workers with a strategy to meet the organization's goals.

2. **Planning:** Very important for the success and effective functioning of the organization not only for organizations but also for individuals. It is the simplest of administrative functions. It involves choosing the tasks, goals, and actions necessary to achieve them. So each organization gives greater emphasis on planning.

3. **Customer Focus:** It is the orientation of the organization towards serving the needs of its clients. Customer focus is usually a powerful contributor to the overall success of a business and includes ensuring that all aspects of the company put its customers' satisfaction first. Also, customer focus usually includes maintaining effective customer relationships and service programs.

4. **Information Analysis:** is the most important function for both private and governmental sector. Specialists obtain, identify, analyze, and synthesize statistics to provide suggestions to policymakers on the important decisions they have to take. These decisions in government affect the provision of basic government services and jobs. In the private sector, it affects the company's ability to meet the requirements of its targeted clients, maintain its competitive position, and contribute to the well-being of its employees and society at large.

5. **Managing People:** It is the process of directing, motivating and training employees to increase productivity and enhance professional growth. Leaders like managers, team leaders and heads of departments, use people management to supervise workflow and enhance employee's performance daily. "

6. **Process Management:** Refers to the alignment of operations with the strategic goals of the organization, the design and implementation of operations structures, the establishment of process measurement systems that are consistent with the organizational goals, and the education and organization of

managers so that they can manage operations effectively.

2.12.2 TQM on Performance

Several studies have analyzed the relationship between TQM in both its forms and performance. While the Implementing of TQM practices is enhanced business performance.

Prajogo & Sohal (2006) found that there is a significant impact of TQM practices on the quality performance of both service and manufacturing organizations, (kee-hung 2003) concluded that both quality management and marketing complete each other to improve performance in an organization. Researchers generally focus on Verify the impact of total quality management on operational performance rather than operational performance.

According to Prajogo & Sohal (2006), the overall operating performance includes three specific areas of a company's outcome:

(a) Financial performance (earnings, return on resources, return on investment (ROI), and so forth.)

(b) Product marketplace performance (deals, market share, and so on.)

(c) Investor return (all-out investor return, monetary worth included, and so on).

A complete review of previous experimental researches on operating performance showed that there are wide ranges of performance measures, and operational performance will be measured by two factors, namely the level of satisfaction and business results. The level of satisfaction in operational performance includes four elements, namely production achieved, employee satisfaction, and satisfaction. Customers, product quality, while business outcomes for operating performance included three components: selling, exporting, and profitability. Prajogo & Sohal (2006)

2.12.3. Previous Studies on TQM

Here below some of the previous studies that handled the Total Quality Management viewpoint.

- A study conducted by Fatima et al. (2016), entitled "The Impact of Total Quality Management Practice on Employee Satisfaction and Performance: The Case of Media Employees". The study aims to confirm the role of TQM practices and their effect on the performance of workers. A sample of 155 was utilized within the survey, and the results of the study and the hypothesis showed that there's a positive and significant impact of Total Quality Management on worker performance and there is a positive and imperative impact on employee satisfaction, it has moreover shown a positive impact of employee satisfaction on his performance, and great utilize of TQM will lead to outstanding performance.

- A study conducted by Martínez-Lorente, Dewhurst, and Dale (1998), entitled "**TQM: origins and evolution of the term**". This paper entitled the development of the components, practices, and systems that characterize TQM. It has been indicated that, while the term TQM just started to be promoted in the mid of the 80s, a significant number of the components that have molded it were grown ahead of schedule, during 1950 to 1970s. Most hypothetical improvements in the headway of the idea have been made in the USA though Japan has held the activity as far as application.

  The paper focused on the absence of an absolute understanding about how to apply TQM, as bolstered by the distinctions in the perspectives on the main quality administration masters. This paper showed as well some differences in the use of TQM among various countries additionally seem to exist. Since the way of life of the organization impacts the way to deal with the utilization of TQM, various nations with various societies apply TQM in various manners. However, the economies and social life for these countries become interrelated to each other's.

- A study conducted by Masterson and Taylor (1996), entitled "**TQM and performance appraisal: an integrative perspective**". This paper focuses on the complementary of both performance appraisal and TQM so that both of them provided an added value to the organization, the study began with an explanation of Total Quality Management using the Malcolm Baldrige National Quality Award criteria and come up with a type of system of performance appraisal and call it Total Performance Management (TPM), the study clarifies how these two frameworks serve to supplement each other, through giving supplementary viewpoints.

- A study by Joyner (2007) defined the relationship between TQM and the organization's performance and addresses the impact of organizational support and co-worker support on the relationship between TQM and performance. This study used a questionnaire that was distributed to companies operating in the automotive industry. The hypothesis test result was a positive effect of implementing TQM practices. "On the performance of the organization, additionally found that the support of the organization and its colleagues have consolidated the relationship between them. The study also focused on the role of employees and their satisfaction with the performance of the institution."

2.12.4 Summary of the Literature on TQM and the Present Work

The current study differed concerning Fatima et al. (2016) which dealt with the role of Total Quality Management practices and their effect on worker performance, and this shows that there's a positive and significant effect of total quality management on worker performance and a positive and significant effect on worker satisfaction, it showed as well a positive impact of the employee's satisfaction on their performance, and a well-practiced use of TQM will cause an outstanding performance. Also, Martínez-Lorente, Dewhurst, and Dale (1998) show differences in the use of TQM among various countries additionally seem to exist. Since the way of life of the organization impacts the way to deal with the utilization of TQM, various

nations with various societies apply TQM in various manners. Whereas Masterson and Taylor (1996), it appears that TQM uses the criteria of the Malcolm Balderd National Quality Award, and come up with a type of system of performance appraisal in other words the Total Performance Management (TPM), the study clarifies how these two frameworks serve to supplement each other, through giving supplementary viewpoints. Furthermore, Joiner (2007) Agrees that there's a positive effect of implementing TQM practices on the organization's performance, and also found that the organization's support and co-workers have blended the relationship between them.

Whereas, the current study versus from all the above previous studies is exploring technology management and Total Quality Management as an operative tool to improve operational performance, to allow decision-makers to identify positive and negative points in the TM and TQM applied by operational performance in Eutelsat.

CHAPTER 3

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

3.1 Overview

The performance of technology management is considered as logical management for any company to realize how to provide all consumer needs and achieve goals at the same time. It is the tool that the company uses to develop activity, flexibility, and competitive position in the market. It is the outline and basics for any company looking for a continuous follow-up, by making all The company's operations are directed at providing consumers (current or anticipated) with needs and desires, and encouraging employees to work as a team.

The activities of technology management consist of ideas and basics that any firm could apply to make better performance, improvement the production, increase earnings and benefits, and evaluate reputation in the local and international market, in terms of a huge number of the firms. So, each firm looking to take a place between competitors has to use this tool to pay it forward in the market.

3.2 Management Definition

Masterson and Taylor (1996) defined management as: “to recognize exactly what you want, then to get sure that your employees applying this with the best and lowest cost possible way”.

Henri Fayol (1930) defined management as: “predict, plan, organize, taking decisions, justify, and control”.

Sharma, & Sharma (2014) defined Management as: “the skill of transforming resources (land, work, capital, and information) to directed outputs to achieve goals”.

Fatimah et. al. (2016) defined management as: “all continue mental efforts for a group of people to achieve goals by taking decisions and using all financials and human resources to get the best results with low cost.”

Palmer & Holt (2009) defined management as: “planning, organizing, leading, and controlling human and financial resources at any firm.”

From the researcher's point of view, management can be defined as planning, organizing, directing, and controlling all financial, marketing, and human products and issues to achieve goals and make decisions in an ineffective and low-cost manner.

Through previous definitions can understand that technology management has these basic elements which are the

1. **Human Resource:** People who work and manage an organization, "as opposed to the financial and material resources of the organization

2. **Goals:** In businesses, it describes what an organization expects or wishes to achieve within a certain amount of time. In other words, what your expectation to be on a future date. Individuals often utilize the term "business goal" with the same meaning. On an individual level, an objective is an idea of a desired or future result that individuals envision, arrange, and commit to accomplish. We usually strive to reach objectives inside particular time by defining deadlines.

3. **Performance:** The completion of a specific task is measured against predefined criteria for accuracy, completeness, cost, and speed. In the contract, performance is considered as the fulfillment of an obligation, in a way that frees the performer from all obligations under the contract.

3.3 The Functions of Management

The basic components of management constantly play a role, whether they control our business or our lives. Management is a set of principles related to the functions of controlling, directing, organizing, planning, and the application of the principles in contlrolling material, financial, human, and information resources effectively to achieve organizational goals. (Yildirim, 2012)

Figure (0-3): functions of the management model

There are five basic functions of management. These are: (Yildirim, 2012)

1. **Planning:** planning is the start point of any managing work, defined as directed, meaning, and organized work to achieve a specific goal in a limited time

2. **Organization:** “it means to collect and linked and activities to achieve goals, by creating the conditions that help to make justification.

3. **Staffing:** It is the task of recruiting and maintaining a suitable workforce for the project at the administrative and non-administrative levels. It includes a procedure of hiring, training, developing, compensating, and evaluating employees and preserving this work force with excellent inducement and motivations. Since the human element is the most important factor in the management process, it is important to hire the right people.

4. **Direction:** stimulate people to work, and establishing communications channels between them and giving them specific orders to achieve goals (Tasie, 2016, 26).

5. **Controlling:** note the progress, reorganization tasks, and correcting mistakes.

3.4 Technology Management Definition

Concerning primary technology management (TM). It should be separated from research and development (R&D) management. As research and development focus on research and how to manage the implementation within the company, while Technology Management includes an intersection between the technology and business not only the creation phase that can be done by the R&D but also the application and distribution, Michael (2004) concluded that Technology Exploitation lies between the research and the development.

Tesar identified the Technology Management as management process that uses internet and business network to plan, direct, and control resources without limits to achieve the firm goals (Tesar, 2008).

Yaseen identified Technology Management as using information technology to evaluate tasks inside the organization (Yaseen. 2005).

According to Carraher identify the Technology Management as the ability to use computers to implement the electronic and management tasks in any place or any time in a simple way (Carraher, et. al., 2006).

According to Maringi identify the Technology Management is use all available techniques to achieve the goals and control procedures (Maringi, 2013).

From the researcher's perspective, technology management can be defined. Such as the ability to use the information and modern technology to carry out tasks and activities using the Internet or the local network at any time or place to increase quality and evaluate performance by linking procedures and reducing the costs of data and information given, to achieve the goals of the organizations.

Through previous definitions can understand that technology management has these basic elements:

1. Using information technology.
2. Connect information technology with management tasks.
3. Evaluate all management activities, simplify procedures, secure use, and decrease time.
4. Improvement management process inside the organization.

3.5 Technology Strategy

Technology may be a worthy resource that the organization must use to obtain a competitive advantage within the market. That could be fulfilled through the use of business methodologies where the most important component is the technology. Choosing the best suitable technological strategy depends on the scope of business and its weaknesses and strengths in respect to the competition and available resources, not just technology but moreover marketing, manufacturing, deals and distribution, and finance. Combined methodologies are utilized, but they will lead to organizational issues once applied (Tesar, 2008).

The essential 4 technological strategies are: (1) first to market; (2) fast follower and over-taker; (3) cost minimization; and (4) market specialty; As described below:

3.5.1 First to Market

It is an offensive marketing strategy, involving high risk and excessive gain. This strategy carried out after discovering an innovative technology by accident or by using design and then materialized it into a product with advantage to the consumer. It is predominantly used employing new high-technology projects, like MapInfo Company, to display pc maps; and by using progressive, well-established companies with a lot of resources, like General Electric, for man-made diamonds and plastics engineering. If the companies can preserve their competitive advantage, the organization has a temporary or near-monopoly that can be exploited to enhance profits and sales. This was the case for General Electric's (GE) industrial diamond and its first engineering plastics, and Lexan. Moreover, scientists discovered these products at General Electric's (GE) research and development center. While investigating the conduct of simple elements, such as carbon, beneath excessive pressure and temperature; and a hard enamel to insulate a copper wire. GE identified the conceivable value of these inventions, dedicated a lot of sources to their development and implementation, and waited patiently (ten years, in Lexan's case) for the cash flow to become positive. Tijia, GE Plastics, launched in 1957, has grown to $ 7 billion by way of 1998 '(Tissar, 2008).

The success of the first marketing approach needs greater than just a technical breakthrough. It is essential properly to either proceed to produce new products primarily based on technology innovation or to preserve market leadership thru non-stop price cuts, so it will rely on cost reduction. It's always easy, as shown through the ability of VisiCalc, the leading organization that manufactured the first spreadsheet software for PC’s. Following a huge success in the beginning, VisiCalc was not intending to develop or even not capable to develop a more suitable model or unique product; Lotus Development overtook it and announced then bankruptcy (Van Grimbergen, 2004).

On the contrary the case of MapInfo, That founded by four college students from the Rensselaer Polytechnic Institute who developed the first software program for showing maps on a computer. While other programs used on mainframes fee between $ 5,000 to $ 20,000, MapInfo supplied Its first software package in 1987 for simply $ 750, putting it within reach of 30 million owners of IBM compatible computer systems around the world. To remain in advance of the competition, MapInfo provides every few months advanced versions of the first software and new applications with additional functionality which leads it to grew its sales unexpectedly from $ 60 thousand in 1987 to $ 60 million in 1998 (Van Grimbergen, 2004) .

3.5.2 Fast Follower and over-taker

When a pioneer proven that such technology is certainly working and the market accepts innovation, the fast follower can get in quickly, gain a giant market share, and even outperform the pioneer participant. To win the usage of this strategy, the fast follower has to now not reproduction the lead's product and depend only on Lower production costs, instead, the fast follower needs more innovation by way of offering a comparable product that can be distinguished from the first participant's proposal. Fast Followers take advantage of their present imperative assets, like manufacturing facilities, Customer communications, organization image, etc., to obtain a large market share and even beat the pioneer. (Van Grimbergen, 2004) it is comparable to first IBM's PC. Influenced by using the apple II sudden success, IBM commenced a crash software to develop its PC. Director Don Estridge used to be given a blank check to secure all essential resources, manufacture or purchase technology, and arrange the team. Within a year, the team developed the IBM Personal Computer, which is roughly equal in overall price and performance to an Apple II. However, the IBM pc was painted in a "light blue" color. That is, IBM relied on its sturdy market position, and as a consequence got an equal market share that of Apple II (Van Grimbergen, 2004). Likewise, GE gives other example of a fast follower. In the area of Computer Technology (CT) imaging, GE differentiates its product from EMI product to developers not just by improved overall performance but also through its highly respected

branding, longer warranty, application engineering, consumer education, and authentication via main clinicians and clinics (Tessar, 2008).

3.5.3 Cost Minimization

This strategy is very high-quality for industrially produced goods, as massive economies of scale can be accomplished by using the innovation process. This method has been carried out effectively by Japan and different Pacific Rim countries to expand a controlled market share in purchaser electronics, and to the reproduction, IBM well-matched computers, Including the fashion industry.

As the technological know-how matures, products come to be standardized, functional differences among different brands reduce among importance, private selling is replaced by way of mass marketing, and the price will become the important element in the customer's selection to purchase. To decrease the cost of production, process innovation replaced product innovation gradually, using a curve. Learning, which predicts unit costs to decrease with increasing volume. likewise, distribution and marketing prices are reduced - for example, through telemarketing, direct mail sales, and cut-price stores. Using a cost-cutting strategy, the organizations pursue to come to have the lowest cost product and consequently the leader by reducing the selling rate and production expenses based on the gaining knowledge curve, the organization forces much less efficient competitors to withdraw, stabilizing the market, and increasing the organization profit and market share (Van Grimbergen, 2004).

Sometimes, the company can be exercising a "forward pricing" lower than real cost, in expectation of gaining knowledge curve, this will "destabilize" the competition, moreover, it will discourage effective viable competitors from sharing the market. Given the potential for antitrust litigation, this practice is greater frequent in Japan - especially between manufacturer of computers - than in the United States (Tessar, 2008).

To be successful in price reduction, the organization wants the most efficient capabilities in process engineering and cost analysis. Also, the

company needs to pursue to minimize its whole costs, no longer simply manufacturing costs, whilst keeping a higher quality level. However, most clients won't take lower quality for lower cost, Detroit located this when it manufactured compact automobiles after the first oil crisis, to get into the competition with the Japanese and Europeans. While Detroit's costs were 15 to 20 percent lower than those of its overseas competitors, the best of its vehicles - measured utilizing the number of faults in The new vehicle - ranged from one-third to one-half of its foreign competitors. As a result, American customers have been willing to pay installments ranging from $ 1,000 to $ 1,500 per car and wait many months for Japanese models, whilst the US versions remained unsold in provider groups (Van Grimbergen, 2004).

3.5.4 Market Specialist

A niche market position or strategy is regularly acquired by new high-tech organizations which trying to find a "location in the sun" in competing with superior suppliers. Earlier in the PC industry, Digital Equipment Corp. Wang and Control Data Corp. used this strategy to compete With IBM. At the beginning chosen market niche is typical of little or no advantage to the superior supplier, who desires to permit competitors to develop it. For example, IBM prevented serving the R&D laboratories and college scientific computing and information acquisition markets, given their restrained size, besides, laboratory researchers and university professors required exceptional features, non-standard components, and complex application architecture that IBM used to be cannot or unindenting to support. Digital tools and manage data had been ready and in a position to supply specialized services for this small but increasingly growing market. Wang market word processor, which is a combination of digital typewriters and small computers, for a while, efficaciously competed with Olivetti and IBM (Tessar, 2008).

To be successful, the market niche needs to be carefully chosen and followed up. If the market region is very small, it then be quickly saturated, because the limitation of growth. Control Data, for instance to enlarge sales, was once forced to abandon its original position and compete with

IBM in information processing, an area with low earnings and market share volatility (Tessar, 2008).

On the contrary, if the area of interest turns too wide, it turns into an attractive goal for competing companies. Cray Research clarifies this. Cray used to be the leader in the niche market that was then limited however very worthwhile for supercomputers. he founded the business enterprise in 1972 with the aim of “designing and building a computer extra powerful than everybody else now.” At the beginning, the market position was once very small, approximately eighty customers worldwide in 1976. The market position had grown to $ 1 billion by 1990, with the entry of organizations Large, like Hitachi, IBM, and Control Data market. Cray Research lost market share, faced serious cash go with the flow issues, had to scale again its superior R&D efforts, and was absorbed in acquisition by Silicon Graphics in 1997 "(Van Grimbergen, 2004).

Another risk of a niche market strategy is potential to destroy the position due to the new technology. For example, the market for word processors in Wang has been wiped out via the speedy advances in microcomputer technology. While word processors are restricted in their functionality, PC features consist of word processing, graphics, calculations, spreadsheets and math operations, which makes it the desired workplace tool (Tessar, 2008).

To achieve success in a niche market or strategy, an organization ought to be selective in accepting requests that require a lot of specialization, these requests require huge and expensive efforts in engineering development and layout to meet the special requirement of the client, so the organization ultimately will become a “workshop” and adapts its designs to serve exceptional clients, however is unable to decrease costs following the gaining knowledge of curve. The secret is to have one or two fundamental designs that can be effortlessly and rapidly adapted to meet consumer requirements while the usage of standardized plant and software operations” (Van Grimbergen, 2004).

3.6 The Goals of Technology Management

According to Wadi (2011) the goals divided as:

Goals related to Consumers:

1. Reduce management complications.
2. Using information technology to increase the trust between consumers and employees.
3. Increase the connection between management and resources.
4. Achieve the best benefits for consumers.
5. Achieve the best resources using to provide better service.
6. Continuous development.

Goals related to management work:

1. Make services level better.
2. Reduce the time of tasks implements.
3. Freelance working (24\7).
4. Reduce costs and capital.
5. Reduce paperwork.
6. Reduce extra human resources (overloaded)

Goals related to decision making:

1. Reduce fatal errors.
2. Provide data and information immediately for the decision-maker.
3. Increase the connection between employees and managers.

Reduce taking decisions complications.

Goals related to competitive advantage:

1. Compatibility with other firms all over the world.

2. Reduce management corruption.
3. Increase competitive advantages.
4. Achieve equality between all consumers.

3.7 Advantages of Technology Management

According to AL_Qudah (2012), the Advantages of technology management as below:

1. Managing all the firm units as one unit.
2. Complete work tasks fast and precision.
3. Increase management's production.
4. Increase effectiveness and reduce errors.
5. Clearance of the service providing mechanism.
6. Connect with other firms all over the world at any time.
7. Increase the concept of feedback.
8. Secured and guaranteed service providing.
9. The clearance of the specializations and responsibilities of the employees.
10. Increase the abilities and personal skills of the employees.
11. Easy and unified procedures forms.
12. Provide data and information easy and fast by using the electronic archive.

3.8 Technology Management Requirements

According to (Ahmed, 2014, 78-81) the Technology management requirements as below:

1. **Make plans and establish strategies:**

   - Putting the strategies by a committee.
   - Putting sub plans.
   - Making researches and studies.
   - Integrate the related information, and determine the portals.

2. **Establish the infrastructures:**

   The infrastructure of any project consists of financial, human, and logical contents, for technology management the infrastructures are:

   - **Computer equipment:** The equipment consists of physical contents such as computers and accessories, software and applications contents, human contents such as programmers, designers, and operators.
   - **Networks:** networks means to connect a set of computers directly together by using wires or wireless to exchange data and information between these computers.

     These networks might be:

     - **Local networks:** this type of network used inside organizations to exchange data between employees in the same building or with other organization branches.
     - **Local network between consumers and organization:** this type of network allows the organization consumers to access the network within limits.
     - **Internet:** this type of network allow any person to access

and communicate with any organization all over the world without any limits to make chatting, calling, E-mail, and exchange files or even buy and sell or make services requests.

3. **Gradual management system development:**

This step could be achieved by:

- Establish new managing units, merge them, or delete them.
- Modify the traditional procedures to make them compatible with the new management.
- Reform the tasks, responsibilities, and determine the limitations of the new units.
- Defined the new management working mechanism.

4. **Educate and train the firm's employees:**

This step is necessary to avoid any complications that may occur during the transformation from the traditional management to technology management, This can be accomplished by:

- Development of education and training systems
- Use new techniques in all firm units, and training the employees to increase their skills.

5. **Defined and update the necessary legal items to protect information security:**

This step needs to cooperate between firms and governments to establish a convenient environment.

6. **The guarantee and protection of information security:**

It means to protect all resources used in information processing, information media, and computers by using professional procedures and tools such as:

- Define security policies.
- Using smart security tools such as IDs, driving licenses, and smart cards.
- Activate the related laws and apply penalties for any technological infraction.
- Use the technical team to develop any failure in the laws.
- Increase the trust between the employees and consumers.
- Use public key infrastructure to make the documentation process.

3.9 Complications of Applying

According to (ALAzzawi, 2014, 100-105) the Complications of applying as below:

Management Complications:

1. The weakness of information programs.
2. The weakness of planning and justifying at the level of high managers.
3. Some firms refuse to make the required changes such as: adding, merging, or delete the firm units.
4. Some managements system and methods have differences inside the same firm.
5. No clear strategic vision about how to use technology in the firm.
6. The weakness of governments supporting such changes.

7. The weakness of applying evaluation.
8. The weakness of justification between managing units at the same firm. Legalizations complications:
9. The traditional lows are invalid for applying.
10. The convenient lows need a long time and hard work.
11. The frequent failure of lows to make proves of increase trust.
12. The weakness of any lows or penalties for any software break or demolition.
13. There are no legalizations to authorize the electronic signature and personal's verification.

Financial Complications:

1. The reduction of financial support and budget provisions.
2. The limitation of training financial sources.
3. Using the internet and repairing costs are so expensive in some countries. 4- The cost of infrastructure establishment.

Human Complications:

1. Most employees have a weakness in their basic skills.
2. Most communities have weaknesses in basic skills.
3. Some employees resist change because they were afraid to lose their jobs.
4. No self-training encourage by managers.
5. The weakness of language and using the equipment.
6. Most people have no trust in electronic dealings.

Technical Complications:

1. The huge and fast development and update of the hardware and

software technology, which make it hard to follow and learn.

2. The weakness of experiences and infrastructures.
3. The weakness of information security.
4. The hardness of development and updates for the used software

3.10 Total Quality Management Importance

The importance of Total Quality Management is clear by the emergence of numerous prestigious awards, like the Malcolm Baldrige Quality Award in the USA, the Deming Award in Japan, the European Quality Award, and the latest establishment of the Singapore Quality Award. These Quality Awards perceive corporations that use satisfactory quality management practices and encourage organizations to put in force TQM to attain and obtain "global" standards. Consequently, these days both manufacturing and service industries extensively implement many practices of TQM (Slim, 2010, 240-242).

TQM is very much related to the manufacturing and therefore its preliminary definition that focus on product quality. The center of attention of quality in manufacturing field is more process-oriented, which focuses on the non-stop development of all processes, functions, and, importantly the business process. Samson, D. & Terziovski (1999) defines Total Quality Management as a philosophy that includes techniques, tools, methods, and concepts which are utilized to business approach by:

1. Concentrate on the market demands to provide for consumer's needs.
2. Achieve quality universal performance.
3. Make some necessary procedures to achieve the performance quality.
4. Continuous scan to all operations to modify it, and make developments.
5. Educate and train the employees to solve the problem.

3.11 The Role of Technology to Improve Operational Performance

Chen et.al.,. (2016) he indicated that to understand the role of technology it plays to obtain competitive advantage and improve operational performance through the impact of these elements:

1. **The product quality:** the technology roles by increasing the quality of the products and exclude the low-quality products.
2. **The financial performance:** the technology roles by development the financial performance and increasing benefits by reducing the rejected product units, and use assistance tools to process the financial information.
3. **Controlling the markets:** the technology roles by collecting the information about the weakness markets of fields and working to compensate any weakness of this market by using modern producing systems to stay in control.
4. **Creativity and development**: the technology roles by using new technology systems to train and educate employees, reengineering process, expansion of digital marketing, provide a full database, or make the big change to convert the traditional management to technical management.
5. **Operations efficiency:** the technology roles by make effective marketing and finding new markets to reduce costs of distribution.

Whereas, AL_Moghrabi (2002) abstracted the previous strategies within these steps:

- Reduce production costs.
- Differentiation of the provided product or service.
- Expanded distribution by finding new markets or increase concentration on the current market.

3.12 Relationship between TQM and Operational Performance

In the literature, all definitions of TQM have revealed two vital aspects which are the (hard) side and the (soft) side. The hard or technical aspect refers to the techniques and tools of management systems, while the soft or

philosophical aspect is concerned with the managerial principles and concepts of TQM (Vouzas & Psychogios 2007). Numerous other definitions of TQM were given (Eriksson & Hansson, 2003), which led to the operational definition of TQM as a philosophical, dynamic approach and an organizational way of life aimed at achieving high performance and customer happiness, which needs commitment from the organizational leadership by adopting quality components Effective (hard and soft) to develop a coherent organizational culture, which promotes the process of continuous improvement of individuals and groups in terms of methods and practices in the overall organizational procedures. Since the (soft) principles of TQM are vital to improving the performance of organizations (Whitney & Pavett, 1998; Vouzas & Psychogios, 2007), this paper will focus on the principles of TQM, which is the main focus of explaining interdependence with knowledge management. Whereas, the relationship between TQM and operational performance has been established in a study by Liao and Wu (2009) that operating performance is a large-scale structure that captures what organizations participate, produce, and achieves for the diverse target groups that interact with it. According to Samson and Terziovski (1999), there is a very strong relationship between TQM and OP and this relationship is cross-sectional (i.e., both influence the other). Rahman and Bullock (2002) have argued, based on several empirical studies, that the relationship and impact of TQM principles on operating performance are undeniable. **(1)**

Several researchers have identified TQM principles (leadership commitment, strategic planning, customer focus continuous improvement, employee engagement, training and learning, rewards and recognition, and management with truth) that can be used in measuring operational performance (Whitney and Buffett, 1998; Zhu & Scheuermann). , 1999; Karia & Asaari, 2006; Vouzas & Psychogios, 2007). From the TQM literature, the concept of Total Quality Management is generally explained based on a set of principles or basic elements of TQM. Whitney and Buffett (1998) clearly

[1] The 2nd International Conference on Technology & Operations Management. Jointly prepared through College of Business, UUM and Institute Technology Bandung, Indonesia, 5 – 7 July 2010. Bayview Hotel, Langkawi Island, Kedah Malaysia.

state that the advocates of TQM agreed that there are a fundamental and critical number of elements that if created would be directed at high performance. However, an investigation into the principles of TQM has led to the identification of eight principles commonly found in the TQM literature.

Ince (2007), explore that the dedication of higher management and leadership in the modern era is necessary to the powerful implementation of TQM in the company. Aydin (2007), explained that leadership supports the managers in establishing long partnerships and relationships with customers, employee, and stakeholders. Zuhair and Sadekoglu (2012) consider the implementation begins and stops with higher management. They carried up this opinion explaining that the good leader to direct the firm to the profitable implementation of TQM has to be the one who can ease the problem solving, improve teamwork, focus employees enthusiasm and interest on maintaining innovation and improvement, be a coordinator of team activities, and acquire Followers acceptance and appreciation,. To support Aydin, Uçüncü, and Tasdemir (2010), Rahman and Bullock (2005) emphasize that perfect leaders may participate in TQM by serving as fans, consensus builder, facilitators, visual advocates, and high-energy insights, such as key factors to stimulate an innovative environment and create options. Others through a logical analysis of alternatives. Rahman and Bullock (2005) highlight that efficient leadership is needed to support an organization to create a high-performance delivery process and a high-performance culture essential to establishing and meeting customer satisfaction.

Given Kannan and Tan (2005), management coordinates, controls, and does things correctly. Whereas, leadership determines vision, unchain energy, and does the correct thing. This argument is also shared by Vanichchinchai and Igel (2011) who confirm that management has the primary role in providing consistency and order to enterprises; leadership do the change.

Shaheen (2011) argues that leadership is a process of social effect that involves persons who influence team’s member to participate voluntarily in a process to achieve the organization goals. Zhang, Linderman, and Schroeder (2012) believe that successful leaders are aggressively seizing opportunities,

anticipating change, correcting weak performance, motivating followers to achieve a high level of productivity, and leading the organization toward achieving its goals. This indicates that leaders play a massive role in confirming that shared values and beliefs are performed in the organization by proving commitment to carrying out a task. They must show interest and interaction with the rest of employees and reinforce the main values of the company. leaders are responsible to bring about the changes needed to reorganize the organization. This indicates that the commitment and leadership of top management are the driving force towards the correct implementation of TQM.

3.12 Relationship between Technology Management and Total Quality Management on Operational Performance

Recent research studies explain the relationship between TQM practices and process performance in different ways. Prajogo (2005) concluded that TQM effect on quality performance is important for services and manufacturing companies. Marketing and Quality management are complementary methods of work, indicating that high levels of quality management implementation and alignment of marketing implementation lead to achieving a high performance level in the organizational through motivation, productive performance, and societal and market performance. However, the impact of TQM on process performance is seldom researched. In most cases, researchers appear to be taking overall organizational performance, rather than performing the processes themselves. Kaynak (2003) justified that quality management practices not only enhance quality performance, but also inventory performance, and also found in his research that quality performance increases the financial and market performance of an organization.

Technology management and total quality management practices might also affect the performance of the process as the operations method has to be aligned with the technology strategy. Some studies have investigated this relationship. Prajogo and Sohal (2006) studied the management of an organization's technology and research and development practices in a single research variable linked to quality and innovation performance

(product and process). Their research demonstrated that technology and R&D practices are highly positively related to both product and process innovation. Their study also revealed an important but weak relationship between technology and the R&D department regarding quality performance. Technology management is just a variable based on the four indicators related questions in Prajogo and Sohal (2006). It does not explore technology management practices in detail. Also, the dependent variables - quality and innovation performance - are evaluated only two dimensions of process performance, quality, and resilience by Gregory (1995), and have been used entirely in research to measure the level of technology management practices and find the effect on operations performance. (Probert et al., 2000)

This study is of great value for operations performance as it highlights the importance of technology management and total quality management. This reflects the need to conduct such a study necessary for this type of study. So the purpose of researching this in the area of technology management and total quality management is that it appears to be important. While companies are looking for a clearer picture to take advantage of, they do not know how to benefit from technology management and TQM activities. Nowadays, Technology and Total Quality Management have succeeded in changing employee attitudes and perceptions and eventually helped revolutionize the utilization of them in many businesses. This allows these companies to conduct face-to-face surveys with employees to obtain relevant information from target groups and analyze results based on their responses. On the one hand, these companies can use face-to-face behavior surveys or any other tool to take action on relevant comments from employees to more accurately meet their needs.

CHAPTER 4
METHODOLOGY and PROCEDURES

4.1 Overview

This chapter deals with the study methods and procedures used to explore technology management and total quality management as an effective tool to enhance operational performance. The study used descriptive and analytical methods. Thus, the literature collected to build study tools and collect data from the study sample, to define technology management and total quality management an effective tool to enhance operational performance, as EUTELSAT workers are the most representative sample of this specialization. The study was conducted at the EUTELSAT Foundation in Nicosia. This includes an overview, study procedures (the main steps of conducting the study), study design, study instrument design, study population, study samples, study methodology, data collection methods, validity of the study instrument, reliability of the study instrument, and data analysis (statistical treatment methods).

4.2 Study Procedure (Main Steps to Carry-Out the Study)

The following methodologies conducted during the current study:

(1) Reviewing the literature related to technology management and total quality management an effective tool to enhance the operational performance: a case study on EUTELSAT Corporation in NICOSIA.

(2) Developing a special questionnaire

(3) Establishing the validity and reliability of the questionnaire

(4) Selecting participants for the study

(5) Administer the questionnaire to participants of the study

(6) Analyzing and interpreting the data using the appropriate statistical methods.

(7) SPSS application as a statistical method of data treatment approaches.

4.3 Study Design

The design used in this study is a descriptive survey. Whereas descriptive research as a distinct process focuses on answering questions like what, who, where, when, and how of the subject under investigation, it usually describes the current situation or process providers. Moreover, the purpose of this descriptive study is to demonstrate that technology management and total quality management are effective tools for enhancing operational performance by applying a selective questionnaire to a random sample of management level at EUTELSAT.

4.4 Design of the Study tool (Study Instruments "Questionnaire of the Study"):

The researcher uses the questionnaire as a study tool to collect data from the study sample. The study tool will be developed based on previous studies and relevant literature.

The tools (instruments) of this study is the questionnaire items consisted of (52) questions and consist of several sections as follows

First: **Demographic Variables:** this part includes multiple items to measure the demographic status of respondents including (gender, Department name, qualification, Length of continuous service with Eutelsat**,** Years of experience before Eutelsat, and Position in the company).

Second: **Questionnaire Items:** this part includes multiple items to measure the technology management and total quality management as effective tools to enhance the operational

performance (*Total Quality Management statements, Technology Management statements, and the operational performance*) which consist overall of (52) items.

The researcher chooses the Likert scale that was used in the development of the study questionnaire to answer the questionnaire elements that reflect the opinions of the respondents to the questionnaire according to a 5-point scale as shown in the table below:

Table (0-2): Likert scale degrees

Strongly Agree	Agree	N/A	Disagree	Strongly Disagree
5	**4**	**3**	**2**	**1**

Moreover, A Likert scale is used to assess the accreditations as the following categories:

- Mean between the interval (1.00 ~ 2.33) → Low
- Mean between the interval (2.34 – 3.66) → Medium
- Mean between the interval (3.67 ~ 5) → High

The above data analysis according to the following equation:

$$\frac{Greatest\ Value - Smallest\ Value}{Number\ of\ Levels} = \frac{5-1}{3} = \frac{4}{3} = 1.33$$

Study Population and Sample Size

Study Population Size

It is worth mentioning that during the study, the researcher was working at Eutelsat where the study took place and handling a Senior Manager of Telecommunication position in Cyprus Nicosia Branch, which facilitates reaching all members at all Management levels either by email address or by personal interview.

The study population consisted of all CEOs VPs, directors, managers, team leaders, and supervisors of EUTELSAT which is equal to (171) Working in the EUTELSAT's Corporation head office and different branches in different countries, this number was based on the information provided by the HR department at Eutelsat which formed the study population size.

Study Samples size

The researcher used stratified random sampling methods where the population was split into seven groups based on the position title which are supervisors, team leaders, Managers, Senior Managers, Directors, Vice Presidents, and Chief officers, the reason behind this method is to make sure all level of management have participated in this study and the sample size selected based on the weight of employees in each position from the total population size, the results and numbers will be shown in the next chapter.

The researcher selected a random sample of (119) employees,this sample size was calculated according to the following equation:

$$\boldsymbol{Sample\ size} = \frac{\boldsymbol{N} \times (\boldsymbol{p} \times (\boldsymbol{1} - \boldsymbol{p})}{(\boldsymbol{N} - \boldsymbol{1}) \times \left(\frac{\boldsymbol{d^2}}{\boldsymbol{z^2}}\right) + (\boldsymbol{p} \times (\boldsymbol{1} - \boldsymbol{p})}$$

Whereas,

Variable	**Value**
Population size represents N value	**171**
The desired margin of error represents the d value	**0.05**
The desired confidence level at 0.95, represents the z value	**1.96**
Population Proportion, represents *P* value	**0.50**

By applying the above equation the Sample size will be 119. Whereas, the number of responses was (102) and the rest were rejected for an incomplete

response which means that the responding ratio is (102/119* 100% = 85.7%) which formed the final sample size of the study sample. all these responses were valid, in such studies, according to (Mugenda & Mugenda, 2009) if the response rate 50% it will be accepted to analyze, if the response rate 60% it is good, if the response rate (≥70%) it's an excellent ratio, that means our response ratio is excellent and logical to provide accurate data.

4.5 Methodology of the Study

Because the field study aims to describe and understand questionnaires, the researcher decided to use descriptive-analytical methods. Thus, literature will be collected to build a study tool and data collection from the use of questionnaires to determine the level of technology management and total quality management as effective tools to enhance operational performance. The researcher also uses quantitative methods. However, quantitative analysis is suitable to draw on to discover various structures, properties, meanings, and changes in phenomena. Whereas the researcher will use the quantitative method among other things because quantitative methods allow a great deal of detailed and valuable information about people's perceptions, ideas, and experiences concerning specific topics or conditions of life. In this case, it will be the executive vice president, directors, directors, team leaders, and supervisors at EUTELSAT (Morse Code, 1997).

4.6 Data collection methods

Data collection methods will involve the authentic practicality of obtaining the data required for analysis. This consists of collecting both Primary (main) and secondary data.

Primary (main) data: the Primary data collection has been obtained through self-administered questionnaire.

Secondary data: Secondary data were collected in this study from the literature review from a variety of sources such as books, magazines, newspapers, Internet, etc.

4.7 The validity of the study tool

Ensuring the validity of the study tool through the validity of the creation that provides many academic specialists with experience and competent evaluators to judge the appropriate degree for the field of study, to ascertain the language of the elements and the extent to which the paragraph belongs to the field. In addition to deleting or adding and making the necessary adjustments to the study tool.

4.8 Study Tool Reliability

The questionnaire of the study comes as an evaluation of related published studies that were already tested by specialized supervisors, this means that the questionnaire passed the test and got the needed approval. In order to make a final checkout for the questionnaire, the researcher applied the Cronbach Alpha test on the questionnaire items.

Reliability of Pilot Study: Reliability had been confirmed through testing and retesting method, where several questionnaires were distributed to (12) CEOs VPs, Directors, Managers, team leaders, and supervisors of EUTELSAT's Corporation (10% of the total sample), and then distribute the questionnaire two weeks after that to the same individuals, whereas, Cronbach alpha factor was extracted for the main dimension and sub-dimensions for all items of the final sample which measures the internal consistency of content and make sure The degree of reliability of the study tool

The results were as the following:

Table (0-3): Cronbach alpha to measure reliability and internal consistency

No	***Dimension***	***Number of Items***	***Cronbach alpha***
1	Total Quality Management statements	29	0.874
2	Technology Management statements	13	0.813
3	Performance	10	0.809
Total (Main dimension: (the technology management and total quality management an effective tools to enhance the operational performance **)**		**52**	**0.832**

The reliability of the questionnaire was assessed by alpha Cronbach by measuring internal consistency by measuring a specific item related to the objective of the questionnaire, the above table (4-2) shows Cronbach Alpha for each item consisting of the study questionnaire. The table shows that the TQM phrases have an alpha of 0.874, the technology management phrases have an alpha of 0.813, and finally, the performance phrases have an alpha of 0.809.

Table (4-2) shows that the final sample result (0.832) was greater than the acceptable value of (0.60), which indicates the consistency of the tool that enhanced the possibility of using it in the study. The Cronbach Alpha test results fit this study. (Secran, 2016).

4.9 Data Analysis (Statistical treatment methods)

The data obtained from the study subjects analyzed with version 21 of the Statistical Package for Social Sciences (SPSS) was used to analyze the questionnaire data. The significance level is set at 0.05. The data was cleaned and examined for missing data, outliers, and broad codes by examining the frequency distributions of all who describe the demographics of the participants.

Descriptive statistics used to draw summaries related to the variables of the current study, including the calculation of means, standard deviations, important levels, one sample test, and the T. test. Also, the analysis contains some tables describing the relationships between the variables of the concepts of the current study. Results to discuss the study of the impact of this information on EUTELSAT performance.

CHAPTER 5
RESULTS and DISCUSSION

5.1 Overview

To achieve the objectives of this study, the researcher used the mythology of descriptive analysis by using statistical tools by the SPSS program and using the questionnaire to collect the required data related to the study concepts, as well as to analyze these data into categories that provide results. To discuss studying the impact of this information on EUTELSAT performance.

5.2 Results of Demographic characteristics data

Frequency and percentages computed for the sample's characteristics, as shown in the table below:

Table (0-4): ***Frequency and Percentage of Demographic as per questionnaire respondents***

Variable	Category	Frequency	Percentage
Gender	Male	70	68.6%
	Female	32	31.4%
Total		**102**	**100%**
Qualifications	Certificate	0	0%
	Diploma	0	0%
	Bachelor's	67	65.7%
	Master's Degree	32	31.3%
	PhD	3	3%
Total		**102**	**100%**
Experience	Less than two years	0	0%

Variable	Category	Frequency	Percentage
years In Eutelsat	2 – 5 years	26	25.4%
	6 – 10 years	54	52.9%
	Over 10 years	22	21.7%
Total		**102**	**100%**
Position Title	Supervisor	42	41.1%
	Team leader	19	18.6%
	Manager	15	14.7%
	Senior Manager	8	7%
	Director	7	6.8%
	Vice president	6	5.9%
	Chief Officer	5	5.9%
Total		**102**	**100%**

The table shows that (68.6%) of the study sample individuals were male, and the percentage of females (31.4%). For Qualifications (65.7%) of the study, a sample was qualified by Bachelor's degree which is the highest category, the other categories were Master's Degree by (31.3%) and finally Ph.D. by (3%), the other categories (Certificate, Diploma) show no frequency at all (Does not Exist). For experience years in Eutelsa (52.9%) of the study, a sample was 6 – 10 years of experience in Eutelsat which is the highest category, the other categories were 2 – 5 years by (25.4%) and finally over 10 years by (21.7%), the other category (less than two years) shows no frequency at all (Does not Exist). And finally, for a position title, (41.1%) were supervisor which is the highest category, the other categories were Team leader by (18.6%), manager by (14.7%), senior manager by (7%), Director by (6.8%), Vice president by (5.9%), and finally, Chief Officer by (5.9%) which is the lowest category.

5.3 Study results related to Descriptive Statistics Analysis (Mean & STD)

Results of Total Quality Management

All means and standard deviations were calculated for all statements related to Total Quality Management as shown in the following table:

Table (0-5): means, standard deviations and degree of Total Quality Management statements

#	Statements	Mean	Std	Degree
1	"Senior executives share similar beliefs about the future direction of this organization"	4.21	0.80	High
2	"Senior managers actively encourage change and implement a culture of improvement, learning, and innovation towards excellence"	4.20	0.83	High
3	"Employees have the chance to share in and are encouraged to assist the company implement modifications"	4.00	0.87	High
4	"There is a high degree of unity of purpose in our company and we have eliminated barriers between individual and/or departments"	4.11	0.81	High
5	"We have a mission statement that has been communicated throughout the company and is supported by our employees"	4.01	0.91	High
6	"We have a comprehensive and structured planning process that regularly sets and reviews short and long term goals"	4.02	0.90	High
7	"When we develop our plans, policies, and objectives we always incorporate the needs of all stakeholders, including the community"	3.99	0.87	High
8	"We have a written statement of strategy covering all business operations which is articulated and agreed by our senior manager"	4.01	0.83	High
9	"We actively and regularly seek customer inputs to identify their needs and expectations"	3.91	0.96	High
10	"Customer needs and expectations are effectively disseminated and understood throughout the workforce"	3.57	1.07	High
11	"We involve customers in our product design processes"	3.84	0.94	High
12	"We always maintain a close relationships with our customers and provide them an easy channel of communicating with us"	3.87	1.00	High
13	"We have an effective process for resolving customer's complaints"	3.93	0.97	High
14	"We systematically and regularly measure consumer satisfaction"	3.86	0.97	High
15	Our company has an effective performance measurement system to track overall organizational performance	3.86	0.99	High
16	Up-to-date data and information of company's	3.85	0.90	High

#	Statements	Mean	Std	Degree
	performance is always readily available for those who need it			
17	Senior management regularly have a meeting to review the company's performance and use it as a basis for decision making	3.92	0.92	High
18	We are engaged in an active competitive benchmarking program to measure our performance against the "best practice" in the industry	4.05	0.87	High
19	We have an organization-wide training and development process, including career path planning, for all our employees	4.04	0.88	High
20	Our company has maintained both "top-down" and "bottom-up" communication process	4.03	0.89	High
21	"Employee satisfaction is formally and regularly measured"	4.02	0.91	High
22	"Employee flexibility, multi-skilling and training are actively used to support performance improvement"	3.96	0.91	High
23	We always maintain a work environment that contributes to the health, safety and well-being of all employees	3.87	0.92	High
24	The concept of the "internal customer" (i.e., the next process down the line) is well understood in our company	3.75	1.03	High
25	We design processes in our plant to be "fool-proof" (preventive oriented)	3.79	0.93	High
26	We have clear, standardized, and documented process instructions that are well understood by our employees	3.92	0.89	High
27	"We make an extensive use of statistical techniques (e.g., SPC) to improve the processes and reduce variation".	3.93	0.92	High
28	We strive to establish long-term relationships with suppliers.	3.91	0.94	High
29	We use a supplier rating system to select our suppliers and monitor their performance.	3.78	1.00	High

The table shows the mean and standard deviation of all 29 statements related to total quality management, with a mean ranging between (3.57 - 4.21) against the general mean of (4.06). Statement (1) which says: "senior executives share similar beliefs about the future direction of this organization" is ranked first with a high degree of importance, with a mean (4.21) and a standard deviation (0.80). On the other hand, statement (10) which says "Customer needs and expectations are effectively disseminated and understood throughout the workforce" has a high degree of importance, with a mean (3.57) and a standard deviation (1.07). Although the degree of importance of this statement is high, this statement is of the lowest order,

which means that the management of the company should pay more attention to the needs and requirements of the customers.

5.4 Results of Technology Management

All means and standard deviations of all technology management statements were calculated as shown in the following table:

Table (0-6):* means, standard deviations, and degree *for Technology Management statements:

#	Statements	Mean	St. D	Degree
30	We always in search of related external product / process / information technologies that would be helpful to advance our business performance.	3.80	0.97	High
31	Our inside and exterior professionals gauge the quality, quantity, and business potential of a technology that is determined to collect	3.67	1.01	High
32	We use to consider the costs associated with bringing a required technology to business	3.93	1.00	High
33	Before going for final selection, we use to request for trial installation / run / use of the selected technology	3.78	0.99	High
34	We look for associate and required information including documentation, training, and other related services from the vendor of the technology	3.92	0.99	High
35	We are in a good understanding of the life cycle of current technologies.	3.78	1.01	High
36	We have a mechanism of benchmarking our technological capabilities with our competitors as well as with international standards.	3.81	1.01	High
37	Our top management is willing to accept technology improvements if necessary	3.99	0.92	High
38	We have a structured process of selecting the best technology for the organization	3.91	0.90	High
39	We have our own R&D department to develop our own product / process / information technologies	3.97	0.89	High
40	We use to hire experts for R&D when it is required to develop new technologies	3.89	0.94	High
41	When new technology is selected, we use to acquire them by a process of technology transfer from vendor	3.83	0.89	High
42	We use to make alliances and merges with external parties to enhance our technology capability.	3.87	0.94	High

The table shows the mean and standard deviation of all 12 statements related to technology management, where the mean ranged between (3.67 - 3.99) compared to the general mean of (3.87). The statement (37) which states that “Our top management is willing to accept of technology improvements if necessary” has a higher ranking and a high degree of importance, with a mean (3.99) and a standard deviation (0.92). On the other hand, the statement (31) which says “Our inside and exterior professionals gauge the quality, quantity and business potential of a technology which is determined to collect” is the lowest-ranked with a high degree of importance, with a mean (3.67) and a standard deviation (1.01). Although the degree of importance of this statement is high, this statement ranks the lowest, which means that the management of the company should pay more attention to quality, quantity, and commercial.

5.6 Results of Operational Performance

All means and standard deviations were calculated for all data related to operating performance as shown in the following table:

Table (0-7): **means, standard deviations, and degree *of operational performance:***

#	Statements	Mean	St. D	Degree
43	We utilize our technological capabilities to improve existing product quality	3.85	0.99	High
44	We utilize our technological capabilities to improve existing product flexibility	4.03	0.80	High
45	We utilize our technological capabilities to reduce production cost	3.91	0.82	High
46	We utilize our technological capabilities to improve yield (or reduce material use)	3.86	0.84	High
47	We believe in incremental development rather than radical change	3.85	0.93	High
48	We maintain well-structured customer-support network using our technology	3.88	0.89	High
49	We believe our technology as valuable assets	3.91	0.87	High
50	We have a proper measurement system to evaluate our technology	3.88	0.84	High
51	We use to take necessary actions to protect our technologies with the use of patent, intellectual property rights, copyright, etc., methods.	3.89	0.81	High
52	We usually monitor the competitors whether they try to copy our technologies	3.86	0.95	High

The table shows the mean and the standard deviation for all (10) statements related to operational performance, where the mean ranged between (3.85 - 4.03) against the general mean of (3.97). The statement (44) that says: “We utilize our technological capabilities to improve existing product flexibility” is of the highest rank and a high degree of importance, with a mean (4.03) and a standard deviation (0.80). On the other hand, the statement (43) which says “We utilize our technological capabilities to improve existing product quality” is of the lowest rank with a high degree of importance, with a mean (3.85) and a standard deviation (0.99). Although the degree of importance of this statement is high, this statement has the lowest rank, which means that the management of the company should pay more attention to the quality of the product.

Results of The relationship between variables:

The researcher utilized Pearson correlation to take a look at the relationship between the study variables associated with TQM (Leadership, Strategy, and planning, Customer focus, Information and analysis, People management, Process management), TM (Identification, Selection, Acquisition, Protection, Exploitation), and operational performance (Cost, Delivery, Flexibility, quality). ***Table (0-8): the relationship between variables***

	Leader-ship	Strategy & planning	Customer focus	Information and analysis	People management	Process management	Identification	selection	Acquisition	Exploitation	Protection	Cost	Delivery	Flexibility	Quality
Leadership	1														
Strategy and planning	0.521	1													
Customer focus	0.522	0.544	1												
Information and analysis	0.455	0.633	0.477	1											
People management	0.622	0.533	0.573	0.687	1										
Process management	0.522	0.583	0.537	0.588	0.688	1									
Identification	0.477	0.512	0.521	0.502	0.633	0.674	1								
Selection	0.522	0.553	0.424	0.500	0.732	0.734	0.655	1							
Acquisition	0.644	0.545	0.477	0.554	0.532	0.587	0.544	0.526	1						
Exploitation	0.519	0.425	0.638	0.456	0.522	0.532	0.511	0.499	0.543	1					
Protection	0.499	0.422	0.633	0.455	0..644	0.634	0.632	0.599	0.444	0.503	1				
Cost	0.422	0.553	0.545	0.664	0.634	0.484	0.519	0.444	0.454	0.511	0.566	1			
Delivery	0.555	0.484	0.501	0.654	0.475	0.400	0.456	0.390	0.400	0.441	0.444	0.500	1		
Flexibility	0.421	0.500	0.603	0.422	0.456	0.421	0.452	0.457	0.403	0.412	0.431	0.457	0.541	1	
Quality	0.484	0.521	0.428	0.529	0.484	0.409	0.488	0.444	0.422	0.499	0.519	0.466	0.514	0.500	1

5.7 Study results related to hypotheses testing (Multi regression analysis)

The researcher applied Multiple Regression analysis to test the main hypothesis of the study,

In the questionnaire the Technology management represented by 13 statement and it was measured through five processes, the Identification process represented by two statements 30 and 31, the selection process represented by three statements, 32,33 and 34, the acquisition process represented by three statements 35,36,and 37, the protection represented by 3 statement 38,39and 40 while the Exploitation process was represented by two statements 41 and 42, where for each process statement the overall data was calculated and used in the analysis of the first hypothesis below.

As for the Total Quality Management in the questionnaire, it was represented by 29 statements, and consisted of 6 factors, Leadership represented by 5 statement, Strategy and planning process represented by 6 statements, customer focus represented by 6 statements, information and analysis represented by 4 statement, people management represented by 4 statements and process management represented by 4 statement, where the overall data were obtained for each process through the statements and used in the analysis of the second Hypothesis.

The operational performance in the questionnaire was represented by 10 statements and was dealt with them as one unit not each one separately with an overall mean 3.97 and 0.74 standard deviation to measure the first and second hypothesis.

First Hypothesis

H_{01}: TM practices have a significant impact on operational performance

Table (0-9): Multi Regression analysis for First Hypothesis

Operational Performance	Model summary		ANOVA			Coefficients				
	R	R^2	F	DF	F sig	Statement	B	St. D	t	Sig
	0.926	**0.848**	**299.827**	**5**	**0.000**	Identification	0.300	0.050	6.445	0.000
						Selection	0.112	0.043	2.998	0.004
						Acquisition	0.133	0.046	2.399	0.021
						Protection	0.430	0.051	6.875	0.000
						Exploitation	0.050	0.041	4.847	0.001

The table shows that R is (0.926) which means that there is a significant relationship between TM practices and operating performance, also R^2 (0.848) which means that (84.8%) of changes to operating performance refer to practices from TM, on the other hand, F is (299.827) with a degree of freedom (5) and significance of F (0.000), which is an important value over F ≤ 0.05. For the variables related to TM (identification, selection, acquisition, protection, and exploitation) all values of significance value ≤ 0.05, according to the previous results shown in the table, we accept the hypothesis “TM practices have a significant impact on operational performance”.

Second Hypothesis

H_{02}: Total Quality Management practices have a significant impact on operational performance

Table (0-10): Multi Regression analysis for Second Hypothesis

	Model summary		ANOVA			Coefficients				
	R	R^2	F	DF	F sig	Statement	B	St. D	T	Sig
Operational Performance	0.850	0.738	389.732	6	0.000	Leadership	0.700	0.550	26.53	0.0002
						Strategy and planning	0.850	0.640	28.89	0.0001
						Customer focus	0.335	0.745	24.61	0.031
						Information and analysis	0.870	0.650	26.75	0.0002
						People management	0.950	0.640	34.85	0.0000
						Process management	0.990	0.850	26.45	0.0003

The table shows that R is equal to (0.850) which means that there is a significant relationship between TQM practices and operational performance, also R^2 (0.738) which means that (73.8%) of changes to operational performance refer to the practices from TQM, on the other hand, F is (389.732) with a degree of freedom (6) and a sign of F (0.000), which is significant value over $F \leq 0.05$. As for the variables related to TQM (leadership, strategy, planning, customer focus, information, analysis, people management, Process management), all significance values ≤ 0.05, according to the previous results shown in the table, we accept the hypothesis “Total Quality Management practices have a significant impact on operational performance”.

5.8 Result of Descriptive Analysis

According to the tables above the results can be summarize as follows:

The following tables describe and analyze the main parts of the questionnaire: Total Quality Management, Technology Management, and Operational Performance. The following three tables describe and analyze the data for these parts by calculating the mean, standard deviation, rank, and importance level for each statement.

Table (0-11): **Means, standard deviations, ranks, and level of sub and main dimensions of the *technology management and total quality management an effective tools to enhance the operational performance* according to study sample responses**

No	***Dimension***	***Mean***	***Std***	***Rank***	***Level***
1	Total Quality Management	**4.06**	**0.67**	***1***	**High**
2	Technological Management	**3.87**	**0.85**	***3***	**High**
3	Performance	**3.97**	**0.74**	***2***	**High**
Main dimension: (technology management and total quality management an effective tools to enhance the operational performance**)**		**3.97**	**0.75**		**High**

Descriptive records in the above table confirmed that the complete management of the technology. The study sample considered that Total Quality Management is a high-quality tool for improving operational performance (as a primary dimension), providing a suggest of 3.97 (SD = 0.75). Responses mean sub-dimensions ranging “between” (3.87 to 4.06). Whereas the higher mean is for the sub-dimension “Total Quality Management” with a mean of (4.06) with

a standard deviation (0.67) with a high level of importance, while the mean of “operational performance” (3.97) with a standard deviation of (0.74) with a high level of importance, The lowest mean for the sub-dimension “Technology Management” is (3.87) with a standard deviation of (0.85) with a high level of importance.

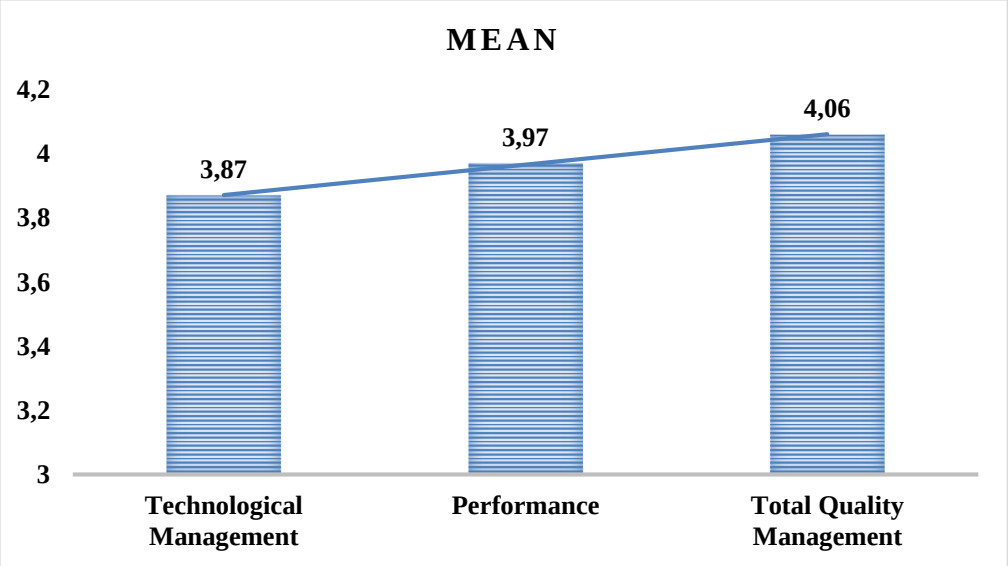


Figure (0-4): *Mean of sub-dimensions of the technology management and total quality management an effective tools to enhance the operational performance*

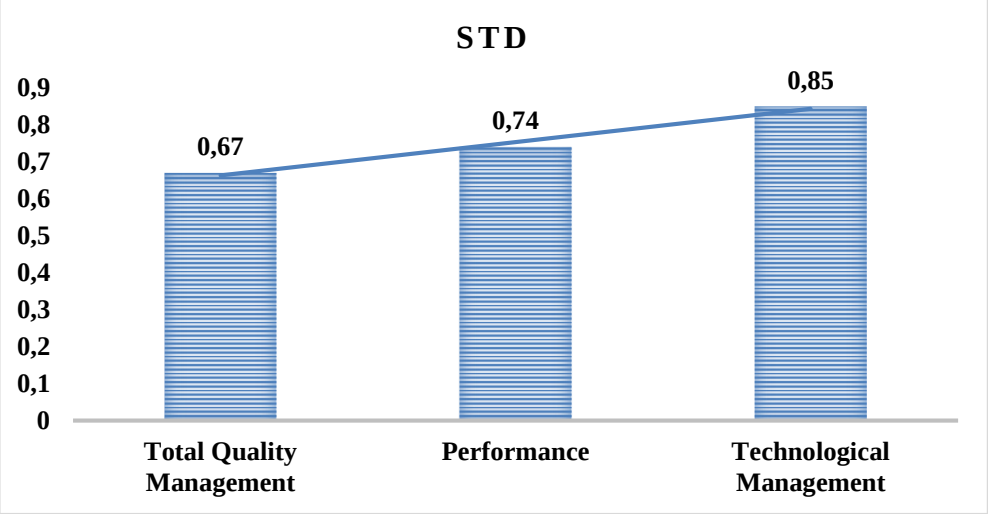


Figure (0-5): Standard deviation of sub-dimensions *of the technology management and total quality management an effective tools to enhance the operational performance*

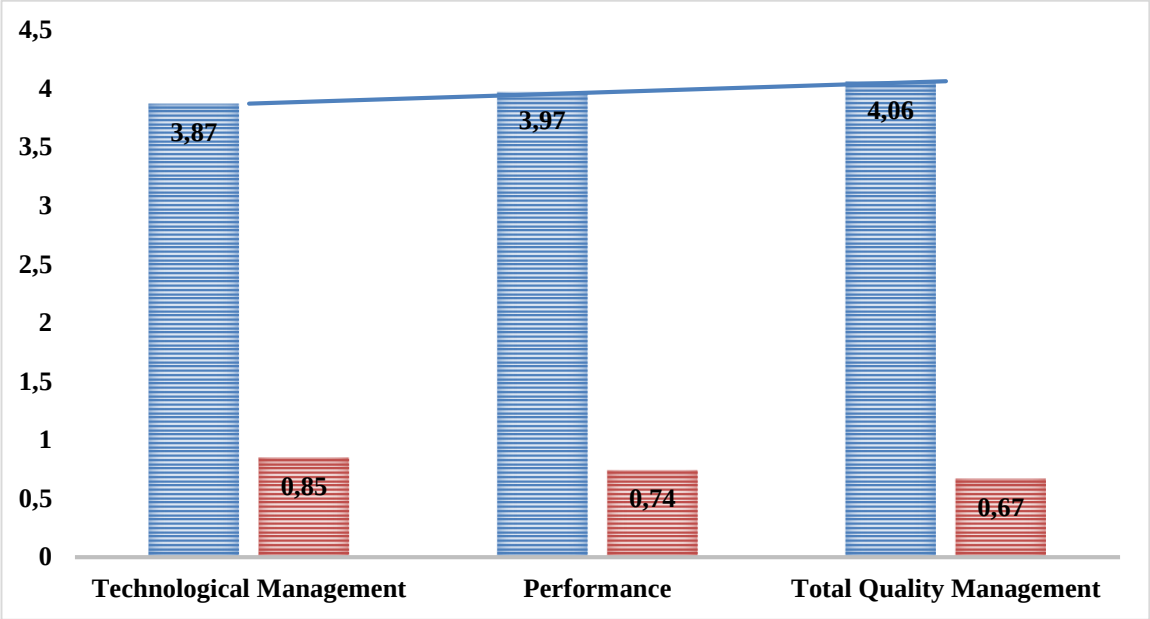


Figure 0-6): *Mean & Standard deviation of Sub and Main dimensions of the technology management and total quality management an effective tools to enhance the operational performance*

Whereas, a summary of the results can be pointed as follows:

- The response rate was excellent (≥70%), and the reliability was above average.

- The main objective of this study is to analyze the impact of TQM and TM on operational performance by studying the relationship between each of the management and then the effect of each management's practices on EUTELSAT's operational performance. The study included two main hypotheses and three main pivotal variables, and the results showed that there is a significant relationship between the variables of each of the management on one side and the operational performance variables on the other side.

- The findings show that means of all statements related to TQM are high, this means that the management of EUTELSAT Corporation is highly concerned about applying the strategies and plans by making clear instructions to develop the provided products and services, it

also means that the management of EUTELSAT Corporation is highly concern about evaluating the operational performance and make the needed development for the operating mechanism. This means that the TQM dimensions are highly understood by the management of EUTELSAT Corporation.

- Also, The findings show that means of all statements related to customer focus are high, this means that the management of EUTELSAT Corporation are highly concerned about attracting new customers and applying the needs and requirements of the current customers by applying the teamwork strategies between the employers of the company, and supporting the factors of TQM techniques and employers personal and teamwork skills at the same time. The statements that related to training are high, this means that the management of Eutelsat company is highly concerned about train the employers to follow the TQM instructions, although, the findings show that this item needs more attention from the management of EUTELSAT Corporation to increase the awareness of TQM impact on the operational performance.

- Finally, the results show that the average of all operational performance data is high, meaning that the presently applied dimensions of TQM and TM have a significant positive have an impact on operational performance factors. This means that EUTELSAT management has already engaged in Total Quality Management and TM practices with some weaknesses that it has to be aware of to enhance operational performance.

5.9 Discussion of study results

As per the study results researcher conclude the following points:

Discussion of Result of Descriptive Analysis

- The response rate was excellent (70% ≤).
- The reliability was above average.
- All means of responses to the sub-dimensions and the main dimension reflect positive opinions about technology management and total quality management, which are effective tools to enhance the operational performance of a high level of importance, and this means that EUTELSAT management pays great attention to improving TQM and technological management on the company's operational performance. The results in this table will be used to compare the results of the data on each part of the table, according to the responses of the study sample.

Discussion of Result of hypotheses testing (Multi regression analysis)

Discussion of results for the impact of TM on operational performance

- The results of the study showed a clear and strong relationship between the TM variables and the operational performance variables which means that operational performance is directly affected by the practices of TM that the management of EUTELSAT Corporation applied, these findings are clearly shown in the analyzed data of the questionnaire and the hypothesis. The findings show that cost is directly or indirectly impacted by the practices of TM, the study shows that selection is highly impacted on cost, and less impacted by the other factors of TM.
- The findings show that delivery is directly or indirectly impacted by the practices of TM, the study shows that Protection is highly impacted on delivery, and less impacted by the other factors of TM.

- Respectively, the findings show that flexibility is directly or indirectly impacted by the practices of TM, the study shows that Identification is highly impacted on flexibility, and less impacted by the other factors of TM.

- Finally, the findings show that quality is directly or indirectly impacted by the practices of TM, the study shows that Protection is highly impacted on flexibility, and less impacted by the other factors of TM. In general, the study shows that (84.8%) of the operational performance factors are affected even directly or indirectly by the practices of TM.

Discussion of results for the impact of TQM on operational performance

- The results of the study showed a clear and strong relationship between the TQM variables and the operational performance variables between the variables of TQM and the variables of operational performance, This means that operational performance is directly affected by the total quality management practices implemented by EUTELSAT management these findings are clearly shown in the analyzed data of the questionnaire and the hypothesis.

- The findings show that cost is directly or indirectly impacted by the practices of TQM, the study shows that People management and Process management are highly impacted on cost, and less impacted by the other factors of TQM.

- The findings show that delivery is directly or indirectly impacted by the practices of TQM,

- The findings show that Information and analysis are highly impacted by delivery, and less impacted by the other factors of TQM.

- The findings show that flexibility is directly or indirectly impacted

by the practices of TQM, the study shows that Information and analysis are highly impacted on flexibility, and less impacted by the other factors of TQM. Finally,

- The findings show that quality is directly or indirectly impacted by the practices of TQM, the study shows that Information and analysis are highly impacted on quality, and less impacted by the other factors of TQM.

- In general, the study shows that (73.8%) of the operational performance factors are affected even directly or indirectly by the practices of TQM.

CHAPTER 6
CONCLUSIONS and RECOMMENDATIONS

6.1 Conclusions and discussion

The present study was conducted to find effective technology management and total quality management tools to strengthen the operational performance case study on EUTELSAT in Europe, Asia, the Americas, and Africa.

According to the discussion of results found through data analysis and based on the current study some of the conclusion can be as follows:

- The study confirmed that to utilize Technology management and TQM effectively, the EUTELSAT Corporation is required to design Technology management and TQM strategy. Based on the results it has been found that in the case of the Technology Management and TQM the most Technology management and TQM practices aspect is to connect with their employees.

- The study confirmed that Technology Management and Total Quality Management have a direct impact on EUTELSAT's operational performance, and this effect has covered all the operational performance factors that include: cost, flexibility, delivery, and quality, which means that the practices of Technology management and TQM need to be changed according to the operational performance factor that the practice engaged with, in another word, the applying of Technology management and TQM

practice should be flexible and convertible with corresponding to the operational performance changes.

- The study confirms that EUTELSAT management is highly interested in applying strategies, plans, and clear instructions for the development of the provided service.

- The study showed that EUTELSAT management is highly interested in performance development, efficiency, and operational mechanism development to provide high qualified services to achieve the company goals related to market share and increase earnings.

- The study confirmed that EUTELSAT management is highly interested in new customers attracting by except their needs and requests.

- The study showed that EUTELSAT management is highly interested in teamwork development in the company by making a convenient work environment.

- The study showed that EUTELSAT management is highly interested in designing clear plans for employers to ensure that they clearly understand their responsibilities, operational laws, and instructions related to quality.

- The study confirmed that EUTELSAT management is highly concern about the creation and new operational mechanisms development to achieve qualified performance.

- The study confirmed that EUTELSAT management is highly interested in making frequent training courses for company employees to increase their efficiency and skills to achieve qualified operational performance.

- The study confirmed that EUTELSAT management is highly

interested to be up to date with the market changes.

- The study confirmed that EUTELSAT management is continuously seeking new customers and markets.

- The study confirmed that Technology management and TQM practices directly influence the operations performance of the organizations, especially the leadership, information and analysis, and people management.

- The study confirmed that Technology management and TQM practices directly influence Cost performance can be enhanced through better information management and people management of the system.

- The study showed that although the full range of technology management practices does not directly affect the performance of operations, the exploitation of the technology in and of itself leads to improved quality.

- The study confirmed that Technology management and TQM practices help to comprise with better operational performance practices.

- The study confirmed that Better Technology management and TOM practices can be achieved from visionary leadership, strategy, and customer focus. The leadership again directs to enhance the strategic planning process and customer-focused decision making.

- The study showed that the Technology management and TOM activities construct can also be improved by appending more indicators, especially for operational performance.

Thus, the current study may have validity for technology management and total quality management, which are effective tools to enhance the operational performance case study on EUTELSAT. This will lead to generating an integrated framework for Technology Management and TOM practices towards the improvement of operational performance.

6.2 Recommendations

It is true that, in the Technology Management and TQM practices on the operational performance, there are additional processes in the EUTELSAT Corporation in Europe, Asia Americas, and Africa, In addition to the traditional processes that need to be applied differently and based on this study below are some recommendations as follows:

- EUTELSAT Management should keep TM and TQM as a part of the operational performance activities.

- EUTELSAT Management should make frequent feedback for the TM and TQM activities to assist in the development of operational performance.

- EUTELSAT Management should pay more attention to training courses for their employees to increase their abilities and skills.

- EUTELSAT Management should share decisions making, and other ideas with their TM and TQM employees to assist in the development of operational performance.

- EUTELSAT Management should encourage and motivate the TM and TQM employees to create new tools and mechanisms to assist in the development of operational performance.

- EUTELSAT Management should keep focusing on the customer's satisfaction by providing their needs and requirements.

REFERENCES

Ahire, S.L., OShaughnessy, K.C., (1998). The role of top management commitment in quality management. International Journal of Quality Science 3, 5-37

Anderson, J.C., Rungtusanatham, M., Schroeder, R.G., Devaraj, S., (1995). A Path Analytic Model of a Theory of Quality Management Underlying the Deming Management Method. Decision Sciences 26, 637-658

Aydın, A., -çuncu, K., & Tasdemir, T. (2010). The Effects of Total Quality Management Facilities Applying in Enterprises on Employee Performance. International Journal of Economic and Administrative Studies, 3(5), 41-62.

Carraher, S., McClure Franklin, G., Parnell, J. and Sullivan, S. (2006). Entrepreneurial service performance and technology management. *Journal of Technology Management in China*, 1(1), pp.107-117.

Cetindamar, D., Can, O., Pala, O. (2006). Technology Management Activities and Tools: The Practice in Turkey. PICMET 2006 Proceedings, 92-98

Eriksson, H. & Hansson, J. (2003). The impact of TQM on financial performance. International Journal of Quality & Reliability Management, Vol. 19, No. 5, pp. 551-566.

Fatimah, (2016) The Impact of Total Quality Management Practice on Employees Satisfaction. *International Journal of Human Resources, 6 (2). pp. 182-195.*

Fening, F.A., Pesakovic, G., Amaria, P., 2008. Relationship between quality management practices and the performance of small and medium size enterprises. Journal of Quality & Reliability Management 25, 694-708

Flynn, B.B., Schroeder, R.G., Sakakibara, S., 1995. The Impact of Quality Management Practices on Performance and Competitive Advantage. Decision Sciences 26, 659-691

Gregory MJ. (1995). Technology management: a process approach. Proceedings of the Institution of Mechanical Engineers 209:347–356.

Gudanowska, A. (2017). Modern Research Trends within Technology Management in the Light of Selected Publications. *Procedia Engineering*, 182, pp.247-254.

Hackman, J. and Wageman, R. (1995), “Total quality management: empirical, conceptual and practical issues”, Administrative Science Quarterly, Vol. 40, Pp. 309-42

Halicka, K. (2016). Innovative Classification Of Methods Of The Future-Oriented Technology Analysis. *Technological and Economic Development of Economy*, 22(4), pp.574-597.

İnce, C. (2007). Effect of Total Quality Management on Employee Satisfaction in Hospitality: Institute of Social Sciences, Sivas.

Joiner, T. (2007). Total quality management and performance. *International Journal of Quality & Reliability Management*, 24(6), pp.617-627.

Jones, G., Lanctot, A. and Teegen, H. (2001). Determinants and performance impacts of external technology acquisition. *Journal of Business Venturing*, 16(3), pp.255-283.

Kannan, V.R., Tan, K.C., 2005. Total quality management, and supply chain management. Omega 33, 153-162

Karia, N. & Asaari, M.H. (2006). The effects of total quality management practices on employees' work-related attitudes, The TQM Magazine, 18(1), 30-43.

Beard, J. W. (2002). Management of Technology: A Three-Dimensional Framework with Propositions for Further Research. Knowledge, Technology & Policy, **15**, 3: 45-58

Kaynak, H., 2003. The relationship between total quality management practices and their effects on firm performance. Journal of Operations Management 21, 405-435

Kaynak, H., Hartley, J.L., 2008. A replication and extension of quality management into the supply chain. Journal of Operations Management 26, 468-489

Kee-Hung, Lai , (2003). Market orientation in quality-oriented organizations and its impact on their performance. International Journal of Production Economics, Elsevier, vol. 84(1), Pp 17-34.

Lakhal, L., Pasin, F., Limam, M., 2006. Quality management practices and their impact on performance. International Journal of Quality & Reliability Management 23, 625-646

Liao, Shu-hsien & Wu, Chi-chuan (2009), The Relationship among Knowledge Management, Organizational Learning, and Organizational Performance, International Journal of Business and Management,.4(4), 64-76.

Beyhan, B. and Cetindamar, D. (2011). No escape from the dominant theories. Technological Forecasting and Social Change, 78(1), pp.103-115.

Maringi, T. (2013). The impact of information technology on the quality management organization in japan. Procedia technology science direct,9 (1),209 – 204.

Martínez-Lorente, A., Dewhurst, F. and Dale, B. (1998). Total quality management. *The TQM Magazine*, 10(5), pp.378-386.

Masterson, S. and Taylor, M. (1996). Total quality management and performance appraisal. Journal of Quality Management, 1(1), pp.67-89.

Michael P. Bigwood (2004) Managing the New Technology Exploitation Process, Research-Technology Management, 47:6, 38-42,

Nazarko, Lukasz. (2016). Responsible Research and Innovation. Conference Proceedings, 10.3846/bm.2016.71.

Neely, A. (2011). Business performance measurement. Cambridge: Cambridge University Press.

Palmer, S. R., & Holt, D. M. (2009). Examining student satisfaction with wholly online learning. Journal of Computer Assisted Learning, 25(2), 101–113.

Phaal, R., Farrukh, C. and Probert, D. (2001). Technology management process assessment. International Journal of Operations & Production Management, 21(8), pp.1116-1132.

Phaal, R., Farrukh, C. and Probert, D. (2004). Technology roadmapping—A planning framework for evolution and revolution. *Technological Forecasting and Social Change*, 71(1-2), pp.5-26.

Powell, T.C., 1995. Total quality management as competitive advantage: A review and empirical study. Strategic Management Journal 16, 15-37

Prajogo, D. (2005). The comparative analysis of TQM practices and quality performance. *International Journal Of Service Industry Management*, *16*(3), 217-228.

Prajogo, Daniel & Sohal, Amrik. (2006). The integration of TQM and technology/R&D management in determining quality and innovation performance. Omega. 34. 296-312. 10.1016

Probert, D., Phaal, R., & Farrukh, C. (2000). Development of a structured approach to assessing technology management practice. *Journal Of Engineering Manufacture*, *214*(4), 313-321.

Rahman, S., & Bullock, P. (2005). Soft TQM, Hard TQM, and Organizational Performance Relationships: An Empirical Investigation. Omega, 33, 73-83.

Samson, D. & Terziovski, M. (1999). The relationship between total quality management practices and operational performance, Journal of Operations Management, 17 (4), 393409.

Brah, S.A., Wong J.L., and Rao, B.M. (2000), "TQM and business performance in the services sector: International Journal of Operations, Vol. 20, No. 11, pp.1293-1312.

Schmidle, T. (2011). Performance Management. *Public Performance & Management Review*, 35(2), pp.370-389.

Sharma, M. S., & Sharma, M. V. (2014).Employee Engagement to Enhance Productivity in Current Scenario. *International Journal of Commerce, Business and Management, 3*(4), 595-604.

Slack, N., Chambers, S. & Johnston, R. (2007) Operations Management, 5thEdition, London: FT Prentice Hall

Terziovski, M., 2006. Quality management practices and their relationship with customer satisfaction and productivity improvement. Management Research News 29, 414-424

Tesar, G. (2008). *Strategic technology management*. London: Imperial College Press.

Vanichchinchai, A., & Igel, B. (2011). The Impact of Total Quality Management on Supply Chain Management and Firm's Supply Performance. International Journal of Production Research, 49(11), 3405-3424.

Vouzas, F., & Psychogios, A. G. (2007). Assessing managers' awareness of TQM. The TQM Magazine, 19(1), 62-75.

Alomary, Azza & Woollard, John. (2015). How Is Technology Accepted by Users? A Review of Technology Acceptance Models and Theories.

Whitney, G. & Pavett, C. (1998), Total quality management as an organization , Quality Management Journal, 5(4), 9-21.

Badawy, M. (1998). Technology Management Education: Alternative Models. *California Management Review*, 40(4), pp.94-116.

Yaseen. S., (2005). Application of Information Technology in the Arab World, Rayad: Saudi Arabia, Institute of the Public Administration

Yasemin Claire Erensal, 2006, Determining key capabilities in technology management using fuzzy analytic hierarchy process. Information Sciences Volume 176, Issue 18, 22 September 2006, Pages 2755-2770

Yildirim, fatihyildirim (2012). Impact of effective total quality management on sustainable competitive advantage**.** Master thesis, university of Amsterdam faculty of economics and business.

Zehir, C., Sadikoglu, E., 2010. The relationship between total quality management (TQM) practices and organizational performance. International Journal of Production Economics 101, 1-45.

Zhang, D., Linderman, K., & Schroeder, R.G. (2012). The Moderating Role of Contextual Factors on Quality Management Practices. Journal of Operations Management, 30(1/2), 12-23.

Zhu, Z. & Scheuermann, L. (1999). A comparison of quality programmes. Total Quality Management, 10(2), 291-297.

Bankole, F. O., Osei-Bryson, K. M., & Brown, I. (2015). The Impact of Information and Communications Technology Infrastructure and Complementary Factors on Intra-African Trade. Information Technology for Development, 21(1), 12 -28.

Zu, X., 2009. Infrastructure and core quality management practices. International Journal of Quality & Reliability Management 26, 129-149

APPENDICES

Appendix (I)

Questionnaire

Respondents Profile

PART A: Demographic

1. Gender :
   Male ☐ Female ☐
2. Name of the respondent (optional)
   ……..……
3. Name of your Department
   (optional)……
4. What is your highest academic qualification? (Tick as applicable).

   a) Certificate ☐
   b) Diploma ☐
   c) Bachelor's Degree ☐
   d) Master's Degree ☐
   e) PhD ☐
5. Length of continuous service with Eutelsat

   a) Less than two years ☐
   b) 2-5 years ☐
   c) 6- 10 years ☐
   d) Over 10 years ☐
6. Years of experience before Eutelsat

   a) Less than two years ☐

b) 2-5 years ☐
c) 6- 10 years ☐
d) Over 10 years ☐

7. Position in the company

a) supervisor ☐
b) Team leader ☐
c) Manager ☐
d) Senior Manager ☐
e) Director ☐
F) Vice president ☐
g) Chief Officer ☐

Part B: The Questionnaire Items

This data is only for academic research purpose and any of the organizational information will not be published, therefore please mark most appropriate measures which fit best with your organizational unit

Please select/tick the number that best reflects what this company has been practicing so far with respect to the following scale :

1= Strongly disagree ; **2**= Disagree ; **3**= Neither agree nor disagree ; **4**= Agree , and **5**= Strongly agree

#	**Item**	**1**	**2**	**3**	**4**	**5**
1	Senior executives share similar beliefs about the future direction of this organization					
2	Senior managers actively encourage change and implement a culture of improvement, learning, and innovation towards excellence					
3	Employees have the opportunity to share in and are encouraged to help the organization implement changes					
4	There is a high degree of unity of purpose in our company and we have eliminated barriers between individual and/or departments					
5	We have a mission statement that has been communicated throughout the company and is supported by our employees					
6	We have a comprehensive and structured planning process that regularly sets and reviews short and long term goals					
7	When we develop our plans, policies, and objectives we always incorporate the needs of all stakeholders, including the community					
8	We have a written statement of strategy covering all business operations which is articulated and agreed by our senior					

Please select/tick the number that best reflects what this company has been practicing so far with respect to the following scale :

1= Strongly disagree ; **2**= Disagree ; **3**= Neither agree nor disagree ; **4**= Agree , and **5**= Strongly agree

#	**Item**	**1**	**2**	**3**	**4**	**5**
	manager					
9	We actively and regularly seek customer inputs to identify their needs and expectations					
10	Customer needs and expectations are effectively disseminated and understood throughout the workforce					
11	We involve customers in our product design processes					
12	We always maintain a close relationships with our customers and provide them an easy channel of communicating with us					
13	We have an effective process for resolving customer's complaints					
14	We systematically and regularly measure customer satisfaction					
15	Our company has an effective performance measurement system to track overall organizational performance					
16	Up-to-date data and information of company's performance is always readily available for those who need it					
17	Senior management regularly have a meeting to review the company's performance and use it as a basis for decision making					
18	We are engaged in an active competitive benchmarking program to measure our performance against the "best practice" in the industry					
19	We have an organization-wide training and development process, including career path planning, for all our employees					
20	Our company has maintained both "top-down" and "bottom-up" communication process					
21	Employee satisfaction is formally and regularly measured					
22	Employee flexibility, multi-skilling and training are actively used to support performance improvement					
23	We always maintain a work environment that contributes to the health, safety and well-being of all employees					
24	The concept of the "internal customer" (i.e., the next process down the line) is well understood in our company					
25	We design processes in our plant to be "fool-proof" (preventive oriented)					
26	We have clear, standardized, and documented process instructions that are well understood by our employees					
27	We make an extensive use of statistical techniques (e.g., SPC) to improve the processes and reduce variation.					
28	We strive to establish long-term relationships with suppliers.					

Please select/tick the number that best reflects what this company has been practicing so far with respect to the following scale :

1= Strongly disagree ; **2**= Disagree ; **3**= Neither agree nor disagree ; **4**= Agree , and **5**= Strongly agree

#	Item	1	2	3	4	5
29	We use a supplier rating system to select our suppliers and monitor their performance.					
30	We always in search of related external product/process/information technologies that would be helpful to advance our business performance.					
31	Our internal and external experts gauge the quality, quantity, and commercial potential of a technology that is decided to acquire					
32	We use to consider the costs associated with bringing a required technology to business					
33	Before going for final selection, we use to request for trial installation/run/use of the selected technology					
34	We look for associate and required information including documentation, training, and other related services from the vendor of the technology					
35	We are in a good understanding of the life cycle of current technologies.					
36	We have a mechanism of benchmarking our technological capabilities with our competitors as well as with international standards.					
37	Our top management is willing to accept technology improvements if necessary					
38	We have a structured process of selecting the best technology for the organization					
39	We have our own R&D department to develop our own product/process/information technologies					
40	We use to hire experts for R&D when it is required to develop new technologies					
41	When new technology is selected, we use to acquire them by a process of technology transfer from vendor					
42	We use to make alliances and merges with external parties to enhance our technology capability.					
43	We utilize our technological capabilities to improve existing product quality					
44	We utilize our technological capabilities to improve existing product flexibility					
45	We utilize our technological capabilities to reduce production cost					
46	We utilize our technological capabilities to improve yield (or reduce material use)					
47	We believe in incremental development rather than radical change					
48	We maintain well-structured customer-support network using our technology					
49	We believe our technology as valuable assets					

Please select/tick the number that best reflects what this company has been practicing so far with respect to the following scale :

1= Strongly disagree ; **2**= Disagree ; **3**= Neither agree nor disagree ; **4**= Agree , and **5**= Strongly agree

#	**Item**	**1**	**2**	**3**	**4**	**5**
50	We have a proper measurement system to evaluate our technology					
51	We use to take necessary actions to protect our technologies with the use of patent, intellectual property rights, copyright, etc., methods.					
52	We usually monitor the competitors whether they try to copy our technologies					

ETHICS COMMITTEE REPORT

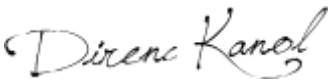
22.09.2020

Dear Mohannad Ahmad Yousef Aldmour

Your application titled **"'Technology Management and Total Quality Management, an Effective Tool to Enhance the Operational Performance of the Organization, case study on Eutelsat Corporation"** with the application number YDÜ/SB/2020/595 has been evaluated by the Scientific Research Ethics Committee and granted approval. You can start your research on the condition that you will abide by the information provided in your application form.

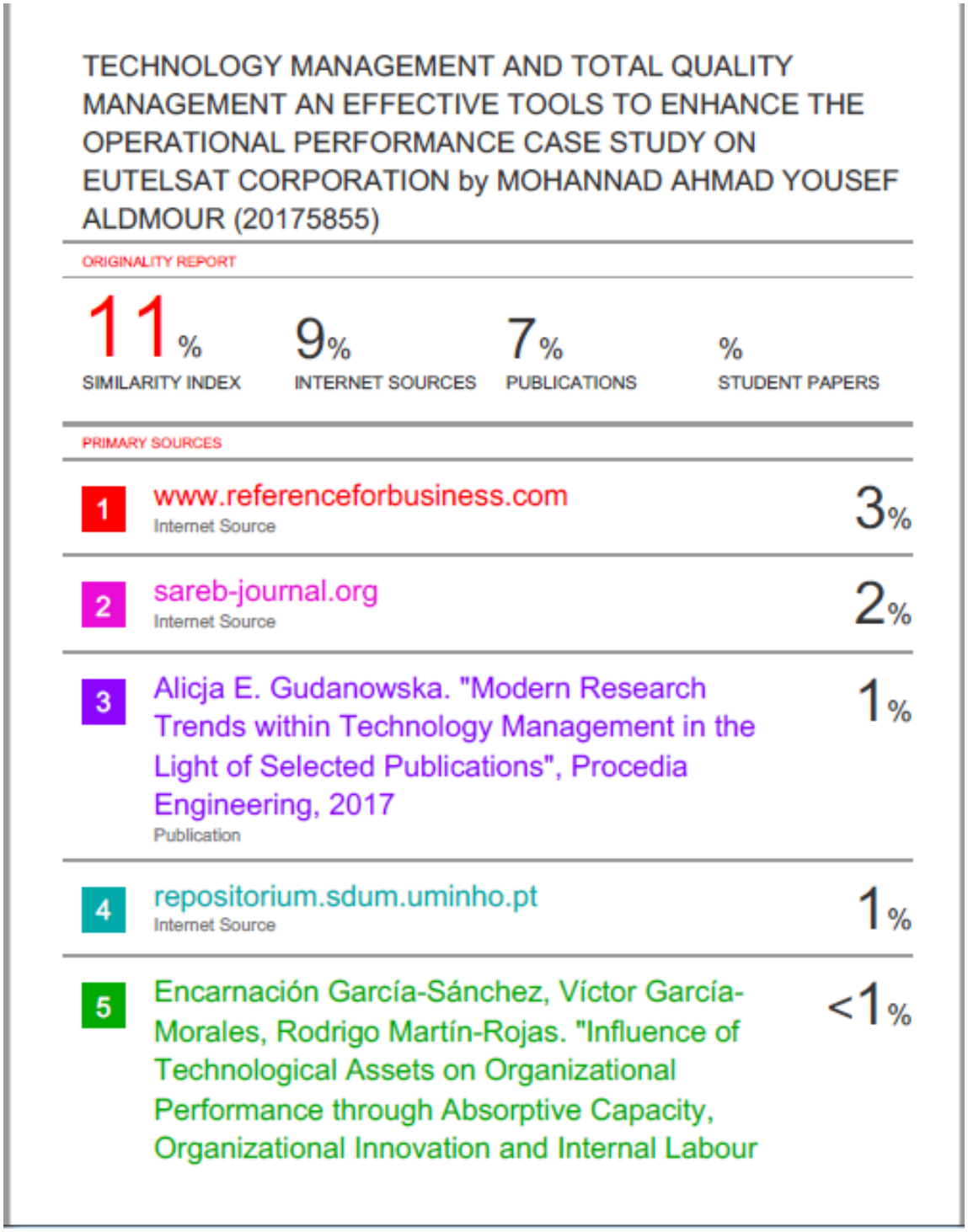
Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee



Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.

PLAGIARISM REPORT



TECHNOLOGY MANAGEMENT AND TOTAL QUALITY MANAGEMENT AN EFFECTIVE TOOLS TO ENHANCE THE OPERATIONAL PERFORMANCE CASE STUDY ON EUTELSAT CORPORATION by MOHANNAD AHMAD YOUSEF ALDMOUR (20175855)

ORIGINALITY REPORT

11%	9%	7%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.referenceforbusiness.com Internet Source	3%
2	sareb-journal.org Internet Source	2%
3	Alicja E. Gudanowska. "Modern Research Trends within Technology Management in the Light of Selected Publications", Procedia Engineering, 2017 Publication	1%
4	repositorium.sdum.uminho.pt Internet Source	1%
5	Encarnación García-Sánchez, Víctor García-Morales, Rodrigo Martín-Rojas. "Influence of Technological Assets on Organizational Performance through Absorptive Capacity, Organizational Innovation and Internal Labour	<1%