A FRAMEWORK FOR QUALITY MANAGEMENT IN HEALTHCARE:

FROM HOSPITAL AND PATIENT'S PERSPECTIVE

by

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A Thesis presented to the Faculty of the
American University of Sharjah
College of Engineering
In Partial Fulfillment
of the Requirements
for the Degree of

Master of Science in
Engineering Systems Management

Sharjah, United Arab Emirates

May 2021

Declaration of Authorship

I declare that this thesis is my own work and, to the best of my knowledge and belief, it does not contain material published or written by a third party, except where permission has been obtained and/or appropriately cited through full and accurate referencing.

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Acknowledgement

Dedication

To my family…

Abstract

Healthcare quality is a complex term to dissect. As several perspectives integrate to assess it, no concrete definition exists, and continuous improvement is very important to cope with the modern-day lifestyle. While many definitions, practices, sophisticated tools have been introduced to understand, measure and assess healthcare quality, the healthcare industry is still struggling to provide state-of-the-art facilities and high-quality services. One of the major findings from the literature is that healthcare quality initiatives are lacking in integrating the perspectives of the main stakeholders that contribute to reciprocation of quality of healthcare. Three main stakeholders involved in determining quality are healthcare management, medical staff and patients. In most of the initiatives, healthcare management perspective and medical staff perspective have been given more importance, but patient perception of quality is ignored. This study intends to understand the important factors of healthcare quality from patient, medical and non- medical perspectives, identify the gaps between the quality perspectives through Confirmatory Factor Analysis and suggest dimensions that can lead to improved healthcare service quality. A structured questionnaire was used to assess the importance and significance of service creation and service delivery components in determining healthcare quality through the eye of the three healthcare stakeholders. The results indicate that administrative services, resource management, job satisfaction and healthcare waste are the main components of service creation process while on the other hand; equipment availability, database, trustworthiness, and patient outcomes are the main components of service delivery in the hospitals of UAE. However, these factors should be the main point of focus in both service creation process and at the point of service delivery to improve healthcare service provided through UAE hospitals.

Keywords: *Healthcare quality; Healthcare perspectives; Walk through audit; Patient perspective; Quality improvement framework.*

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List of Abbreviations

EFQM	European Foundation Quality Management Excellence Model
GMT	Greenwich Mean Time
HHS	Department of Health and Human
IOM	Institute of Medicine
ISO	International Organization for Standardization
JCI	Joint Commission International
LSL	Lower Specifications Limit
MBNQA	Malcolm Baldrige National Quality Award
OECD	Organization for Economic Co-operation and Development
QIO	Quality Improvement Organization
QI	Quality Improvement
QM	Quality Management
TQM	Total quality management
USL	Upper Specifications Limit
WHO	World Health Organization
WTA	Walk through Audit

Chapter 1.   Introduction

This chapter intents to develop an understanding of quality, quality in healthcare, assessment of quality, explaining the problem statement and objective of the study.

1.1.   Quality Overview

Quality is defined in several ways; it may relate to one or more most desired characteristics of a product or service should possess. Quality plays a vital role in customer's decision or selection among different products and services and substantial element to increase profitability as well as return on investment and effectiveness of other business processes either financial or non-financial. By saying customer it refers to individuals, organizations, retailers, military or defense, bank and other financial institutes[1]. Healthcare quality is a term exchangeable for effective and efficient healthcare facility processes, this study gives a brief overview on definition of quality, dimensions of quality, different perceptions of quality, tools and practices available to improve the quality and major awards and recognitions. Identification of research gap, formulating a problem statement and structuring a research methodology to achieve the objective of the study. The purpose of the study is to integrate patient perspectives into the quality improvements practices.

1.2.   Definition of Quality

There is no unique definition exists for quality, different authors have defined it in different ways. There is no conclusive explanation for quality, as its beauty resides in the eye of viewer. In early 90s, International Organization for Standardization(ISO 8402:1994) defined the quality of a product or service as "the totality of characteristics of an entity that bear upon its ability to satisfy stated and implied needs"[2]. With the passage of time this definition is being changed, based on the philosophers, industrial experts and consumer perspective. Quality of a product leads to tremendous amount of variation depending upon the industry to which the product belongs.

A publication published in by Spathet, al. in 2009, states that "Quality involves meeting or exceeding consumer's expectations. Quality is dynamic and can

be improved with the passage of time[3]. In 2013,Montgomery explained quality through a traditional definition that exist for any product or service quality as "fitness to use" while quality improvement is defined as "Quality improvement is the reduction of variation in the processes and products"[1]. An article by Geneva Business News published in 2014, states that the quality refers to "the set of inherent properties of an object that allows satisfying stated or implied needs" and "quality of a good or service is the perception that a customer has about it"[4]. A recent study in 2019 by Quality Management professionals, proposed that the quality of a product is "Satisfying a set of explicitly or implicitly defined inherent characteristics"[5].

Quality can be explained in different ways by considering different industry dependent factors as the quality defined for a automobile parts manufacturing company is different than the company serving in defense field or a bank or a construction company. The standards and measures of quality are industry determined, as well as the perspective of the individual. A technical person considers the technical aspects of a product, business personnel will care about the profit and return on investment whereas the product quality from a customer point of view is one that meets the need and expectation of an individual. We can also say that quality is an attribute of a product or services which may depend on the perspective of the evaluating person. Quality is a variable term for different perspectives so there is no universally accepted definition of quality exists[3].

1.3. Dimensions of Quality

In 1987, Garvin purposed a framework of eight main categories, upon which quality can be defined, for any organization serving the consumers with goods and services[6]. These are called "Dimension of Quality" and these categories are adequate to define quality of any product and service whereas these eight are not the only dimensions for quality, it can be changed for different products or services depending upon the nature of the businesses[7]-[8].The proposed eight dimensions of quality are:

> 1- *Performance* is the degree to which the product is serving the designated job, meeting the customer's expectation from the product. The product is

designed to get any task done which was previously hard or not possible. To what extend the product is fulfilling its duty?

2- *Reliability* is the degree to which its potential customer can rely on this product. This relates to the failing of the product under certain circumstances. It is vital contributor towards the quality of a product at industrial level.

3- *Durability* is the degree refers to the lifetime of a product and how long lasting is the product? It may also depend on the type, category and usage of the product.

4- *Serviceability* A product in use is often need some repairs or maintenance, this dimension indicates towards the repairing procedure of the product is it an easy job or a tough one.

5- *Aesthetic* refers to the degree of look and feel of the product. The appearance of the product (color, size and shape etc.), is the product physically appealing to the potential customers? Today is a world of latest technology and user-friendly equipment and gadgets, it also linked to the easy and decent hardware designs.

6- *Features* refer to the set of characteristics contained by the product to get the job done. For example, every cell phone has a feature of time and date display, in old cell phone user need to manually set the time and date whereas now a days it is an automatic setting through the location (GMT) assessment.

7- *Perceived Quality* may link to the good will or the brand of the product. The reputation of the company within market, if the product belongs to a renowned company than its perceived quality is better than the newbies. Customers already have a bond of trust and loyalty with that company assumes that the quality of the new product will be same or better than the existing ones[7].

8- *Conformance to Standards* is a degree to which the created product according to the design of it. As finished product may not be the same one the designer intended to produce as this may cause disruption in the entire product cycle, increases waste and cost of the product[1]-[8].

There are a few other dimensions for quality that varies industry to industry and imply to only product or only service for example for banking, financial institutes and healthcare sectors are the categorized a service providers so responsiveness, professionalism and attentiveness[1] can be added to quality evaluation.

1- *Responsiveness* indicates to how quick the service provider responds to user's request. For example, if user raises a request of opening a bank account, how long would it take?

2- *Professionalism* indicates skill and competency of the service provider. For example, in a hospital expertise and experience of the front-line staff, as it is relevant to human life.

3- *Attentiveness* refers to the mindfulness and attention of the service provide while processing the request it also may refer to human error.

4- *Value of money* refers to the service provided worth the amount of money which is charged from users[9]. Is the monetary value attached to that service is acceptable or justifies?

1.4. Concept of Quality Improvement

Quality is not a static notion nor it's a discipline or a program that have starting and finishing points, it needs to reside in the organization as a "culture". Consumer needs and expectation are fluctuating day by day and due to the increasing competition within the world, it is very important to improve the product according to the requirements. We can say that quality is a notion that needs a continuous improvement and always be in supervision[5]. The science of collaborating all the people, processes, stakeholders, and technologies that are involved in an organization's culture of quality, as well as the key business objectives that make up its goals is called the Quality Management (QM), but the question rises here, how a company/business can improve or manage the quality of the product without measuring or assessing the quality.

1.4.1. Tools for quality assessment. There are various systematic frameworks used for quality assessment and implement quality improvement processes are available in the literature. The term "Quality" must be assessed first

before it can be managed or improved, using a quality improvement process best fit for the specific company/project will give the fruitful results.

1.4.2. Shewhart cycle. Shewhart cycle is one of the tools used for quality assessment of products, it is a four-step procedure Plan-Do-Check-Act often called PDCA cycle as shown in Figure 1.1. The first step is to Plan the change, recommend an initiative for a change that the company wants to bring align with the aim for improving the quality. Second step is Do, execute the change or embed it within each department, next step is Check evaluate the result appears after that specific change and perform a detail analysis of all the statistics. Last step is Act, after the detail analysis either the change has been adopted if the successful results are achieved or dismissed due to inappropriate results [10]-[11]. Perform few iterations of the Shewhart cycle of the company's quality evaluation and point out the best quality improvement process.
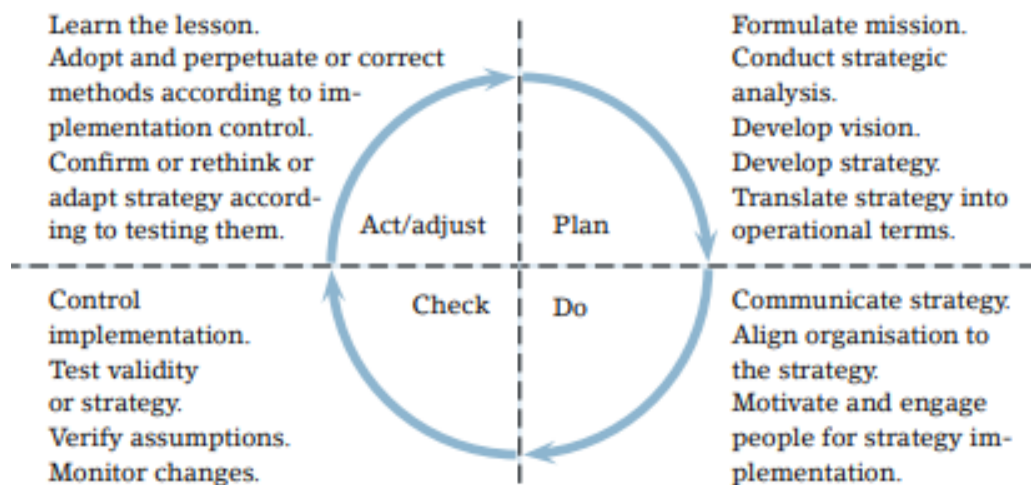
Figure 1.1: PDCA cycle [11]

1.4.3. Six sigma. Six Sigma is another tool that is used to evaluate the quality of a product through the reduction in the number of defects and variation in the product. A normal distribution curve shows the quality characteristics of the product with a center at "T". Initially, Three Sigma Model is introduced with +/-3 sigma

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deviations on either side from the mean of the quality characteristics of the product. The probability of non-defective product is 99.73% as shown in Figure 1.2. Upper Specifications Limit (USL) is +3 sigma and Lower Specifications Limit (LSL) -3 sigma with a target "T" (mean of distribution) at the center.

Spec. Limit	Percentage Inside Specs	ppm Defective
±1 Sigma	68.27	317300
±2 Sigma	95.45	45500
±3 Sigma	99.73	2700
±4 Sigma	99.9937	63
±5 Sigma	99.999943	0.57
±6 Sigma	99.9999998	0.002
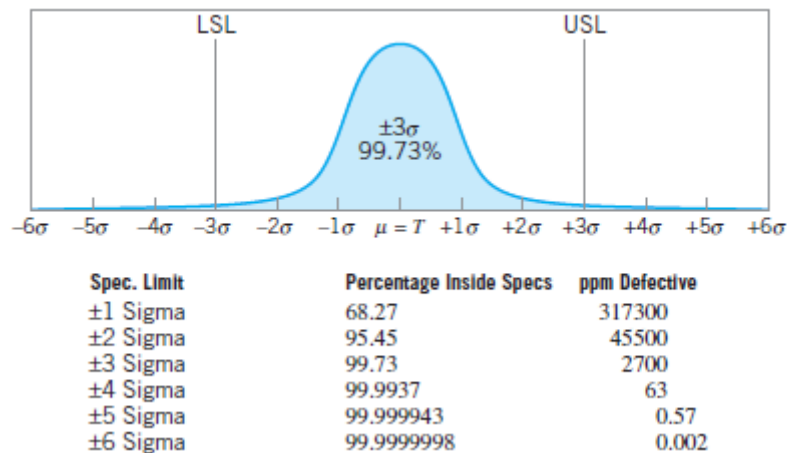
Figure 1.2: Normal distribution centered at the target (T) [1]

Six Sigma is a concept first introduced at Motorola, the spread of the defects is within the range of +/-6 sigma on either side of mean. It assumed that under six sigma quality, the probability of the product to be non-defect is elevated to 99.999%. With the very low probability for the defects in product, still there are few problems one of them is this model have some disturbance and noise that could shift the mean 1.5 standard deviation on both sides from the original mean of the defect [1].

Six Sigma quality improvement processes usually use different approaches to solve the problem. Six Sigma can be implemented on projects that can be of short to medium size (typical duration 4 to 6 months) so it is important to design an appropriate structure or process through which the Six Sigma model can be used. Following are the Six Sigma approaches for the quality improvement [12].

1.4.4. Dmaic (define, measure, analyze, improve, control). DMAIC is the most effective approach for improving the quality whereas it is quite convenient to manage and organize the improvement efforts.

- *Define*–Identify the process or product where the improvement is required.

- *Measure* - Identify the critical features of the product that are mainly related to the customer need and contributors towards customer satisfaction.

- *Analyze* - Perform an analysis on the current process in order to find the potential sources for quality improvement or performance improvement.

- *Improve* – Choose the critical characteristics of the product or a process have sufficient room for improvement and implement the changes.

- *Control* - Monitor the performance of the new conditions by using statistical control methods and document the changes from the previous version. This process can take several iterations to get the required results.

1.4.5. Lean systems and design for Six Sigma (DFSS). Lean Systems specifically target the process of quality improvement by reducing waste. Waste indicates here the waiting time and cycle time between different processes of the product. Lean systems also include the activities related to the rework, reduction in scrap production. Reduction in the rework activities and scrap also reduces the excess variability in the product. The Six Sigma lean approach uses process cycle efficiency as a key metric. It involves value-add time is the total time actually spent in the process that transforms the product into something for which customer willing to pay an amount (usually in dollar ($)). Process cycle time (PCT) is defined by using **Little's Law** (PCT= Work in progress / Average work completed).

Process Cycle Efficiency is also considerate metric refers to overall direct measure of the efficiency of the process to convert the work in process into finished products or services. Lean systems aim to reduce PCT over few numbers of iterations. We can say lean systems refer to optimizing the overall time of the product development [13]-[1].

DFSS is an approach used for the efficient innovative technology enabled products, services or processes by identifying the customer requirement, through utilizing customer's opinion and feedback while responding to fluctuation in the customer demand day by day. DFSS provide an entire framework from the development of the product according to the customer needs until the final product launch[1][13].All the above mentioned Six Sigma approaches can fit together and complement each other, serve different purposes, have different constraints and provide different outcomes. Figure 1.3 illustrates the key areas of improvement, outcome, and benefits of each approach. This section provides a brief introduction of quality, dimensions of quality and tools for quality assessment, the next section entails a detailed explanation of the quality management in healthcare service, factors affecting healthcare quality and the different perspective of healthcare quality.
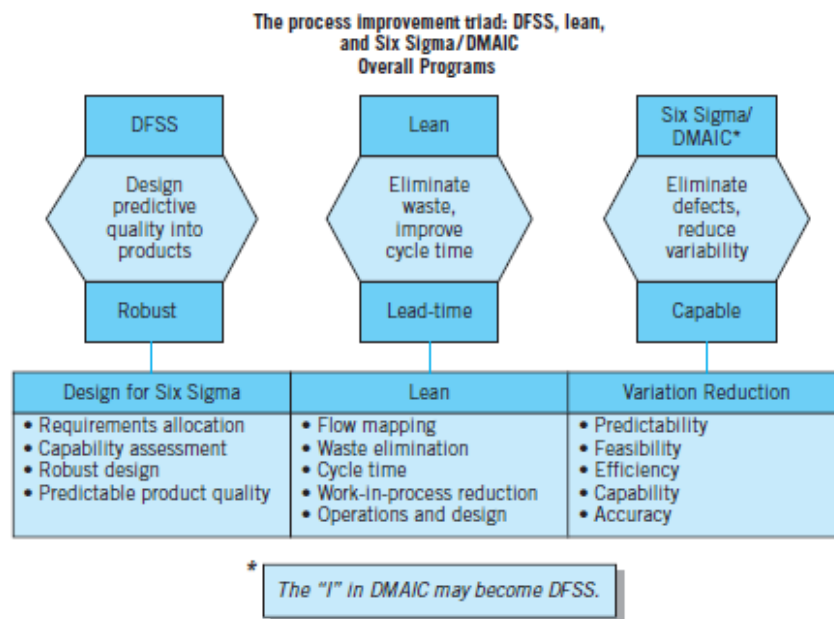
Figure 1.3: Six Sigma Approaches (DMAIC, lean, and DFSS) [1]

1.5.   Quality Management in Healthcare

Healthcare has the same structure as of any other organization provides different products/services includes consumers, purchaser and providers of goods/services. In healthcare system the patients are the "consumers" of the service, the stakeholder which are paying for the service either directly "patients" or indirectly

are "payers" of the services. Indirect purchasers can be insurance companies, government funding for the service while direct purchasers can the patients themselves. All the front-line staff working to facilitate the patients/consumer can be categorized as "providers" it includes clinical and non-clinical staff including doctors, nurses, technicians, lab assistants, clinical support and administration and clerical staff[14].A traditional healthcare system is represented in Figure 1.4.

Healthcare system is always eager to improve the quality of service and improve people's lives. The management side of the industry is always as essentials as the root of a plant and plays a vital role in building a sustainable and reliable ecosystem.
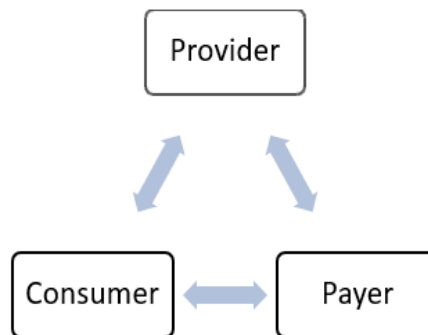
Figure 1.4: Healthcare System

Management is an art to keep a process in a well-organized structure as many business success factors can be talented team and well managed infrastructure of the organization. As discussed later in section 1.1, the healthcare industry is evolving day by day, the structure, financing of the healthcare, new laws and regulations, technological innovations, and research on treatments are introduced frequently. So, it is very important to have an effective quality management practices within the healthcare center to incorporate the recent trends and cope up with the modern world. Quality management is also linked to the quality improvement of the healthcare services, a study published in 2017 by Joint Commission Journal on Quality and Patient Safety aims to explore the English-language articles defining the high performance with respect to a healthcare system. The two-database accessed PubMed and WorldCat from 2005 to 2015 and the New York Academy of Medicine and Grey

literature Report from 1999 to 2016. The study concluded that the two commonly found and most paired dimension were quality and cost [15]. Cost of healthcare facility is out of the scope of this study; the focus will be of quality of healthcare.

Quality managers in healthcare is also become important position in the healthcare industry as this person is responsible of integrate the advancements in the existing healthcare system effectively. Organizations are introducing different degrees and courses for the professional development of the professionals [16].This section further explains the background of quality management, awards and recognitions of healthcare quality.

1.5.1. Quality in healthcare. Quality management is always considered as key tool to enhance the clinical governance and standards of patient's care. Importance of quality management in healthcare can be justified by numerous reasons, resource planning and efficiencies, reducing clinical and non-clinical errors and maximize the improvements in the outcome and aligning the facility care with the patient's need at the time of requirement [17].

Quality specifically for healthcare is more complex to understand as there are different perspectives of quality exist from all the contributing stakeholders that translates quality from their own perspectives. Perception of quality in healthcare involves multi-dimensions as it can be variable term and depends on who defines it, for example quality of a hospital have different important factors when defining and evaluating quality of the service whereas patients have different considerate factors for quality of service than the hospital staff. Even within the hospital different point of view of quality exists, clinical staff have different priority to seek quality however, non-clinical staff refers to other dimensions of service to explain quality. Hospitals have the same hierarchy or division of employees as the other organizations, as clinic staff which is concerned with doctors, nurses, pharmacist, lab technician and other staff with some medicine knowledge related jobs. Non-clinical staff includes administrative staff, management staff and other staff with no medicine knowledge related jobs. Patients are considered as the end consumers of the healthcare services, with no medicine knowledge so the criteria of quality can be different than the hospital staff. For the staff having medical knowledge a word of "clinical staff" will

be used in the entire report and for the staff having no medical knowledge excluding patients a term "non-clinical staff" is used, whereas, for "patient", "consumer" or "customer" can be used alternatively.

Clinic staff considers technical abilities as quality service, non-clinical/administrative considers management aspect of the hospital process and have quite different criteria of quality of the healthcare. End consumers of the healthcare services have quite different criteria of quality than the hospital staff.

1.5.2. Background of quality in healthcare. Quality in healthcare refers to "the degree of health services for individuals and population increase the likelihood of expected healthcare outcomes are consistent with current professional advancement in the field"[18]. Quality of healthcare service has been evolving from the past few decades, the experts and researchers are continuously in the struggle to capture the true meaning of quality in healthcare. Different studies claimed on various important factors, methods of evaluation, different perception and other components of the healthcare system as a reflection of quality service over the past 50 years and still eagerly working on it to grasp the original essence of quality in healthcare.

In 19th century, according to Dr. Avedis Donabedian study published in 1966, a conceptual study claims that the healthcare quality is "remarkably difficult notion to define"[19] and he tried to assess the quality of healthcare by considering set of indicators outcome of care, number of deaths, process of care and recoveries etc. by using clinic records, performing statistical and sampling techniques.

In 1990, the Institute of Medicine (IOM) committee designed a strategy of healthcare quality assurance purposes and published the definition as "Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" [3].

After a couple of decades in 2009, healthcare quality was explained by taking patients satisfaction into an account and stated healthcare quality as a function of patient satisfaction. Healthcare quality affects the patient satisfaction and not an easy element to measure, it can be operationalized using a multi-disciplinary approach that combines patient satisfaction as well as experts opinion [20].

The transformation of the definition of healthcare quality is demonstrated in a recent report of Organization for Economic Co-operation and Development (OECD) published in 2019 [21], which shows how healthcare quality definition is developed over last few decades. Table 1 shows different definitions for healthcare quality from 1980 until 2018 by renowned authors, publications, and organizations.

In 1980, quality of healthcare refer to measure of patient welfare and care, after a decade it evolved into the measure of patient's desired health outcome from desired health outcome from the service providers and professional knowledge of the clinical staff. In 1997, it is approximately the same as the 1990s definition the two main measured elements (desired health outcome, professional knowledge) remain the same. In 2010, European Commision, introduced healthcare quality safe, need fulfillment and preference of patients, only considered the outcome factor of the service.After almost eight years in 2018, World Health Organization (WHO) targeted three main categories of the healthcare service, the measure of effectiveness, people safety and people centredness as the main contributors towards the healthcare service quality[21].

A study publised in 2016, raised voice over the different concept of quality and definitions, exists because this term need to take into account the three perspectives from the healthcare stakeholder (management, clinical staff and patients). The study states the concept of quality of care means different things to different stakeholder involved in the healthcare system, quality can not be explained through a generic definition/ concept that cannot be applied to all stakeholders within the healthcare system in a same manner infact all stakeholder have different set of attributes and dimensions through which they evaluate quality of healthcare [22].

1.5.3. Awards and recognitions in quality. Healthcare is one of the sensitive industries as it stakes the human life and health, a service that serves all essential needs of patient and facilitate people is very important for a healthcare system. As discussed in section 2.1, the ambiguity attached to the understanding of healthcare quality, experts used several standards, accreditation, awards, and recognition models to indicates the service of the healthcare center and assess the crucial components of quality of healthcare.

Table 1.1: Evolution of Definition of Quality from 1980-2018

Donabedian (1980) "Exploration in quality assessment and monitoring. The definition of quality and approaches"	Quality of care is to expect the maximize an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts.
Institute of Medicine, IOM (1990) In: Medicare: A Strategy for Quality Assurance"	Quality of care is the degree to which health service for individuals and populations increase the likelihood of desired healthcare outcomes are consistent with current professional knowledge.
Council of Europe (1997) "The development and implementation of quality improvement system (QIS) in healthcare"	Quality of care is the degree to which the treatment dispensed increases the patient's chances of achieving the desired results and diminishes the chances of undesirable results, having regard to the current state of knowledge.
European Commission (2010) "Quality of Healthcare: policy actions of EU level. Reflection paper for the European Council"	Healthcare is an effective, safe and responds to the needs and preference of patients.
WHO (2018) "Handbook for national quality policy and strategy"	Quality health services across the world should be effective, safe and people centered.

These standards are developed to understand the infrastructure of the center, service provided to patients and other important aspects of a healthcare system. However, there are many quality assurance initiatives are taken around the globe, this section explains few commonly known quality standards and accreditation.

Malcolm Baldrige National Quality award (MBNQA) was introduced in 1987 with a category added for healthcare in 1999. The award envisioned as a "standard of excellence that helps US organizations to achieve high-quality", the award not only recognize the achievement but also raises an awareness that quality and performance are important factors to stand out in a competitive world. The Baldrige award represent a framework of seven important categories of performance excellence, these categories supports an organization to overall improve the performance [23].

Deming Prizes is the oldest and well-known prizes for different industries that have implemented Total Quality Management (TQM) practices within the management infrastructure. This is an annual prize and no limit to the number of deserved recipients of the prize each year[24]. TQM practices are being assessed with the organization's management practices from a Deming prize committee no later than a year the application for the prize is submitted.

European Foundation Quality Management Excellence Model (EFQM) is one of the widely used framework for quality assessment, it helps people understand the relationship between the organization practices and what are the outcomes required by the organization. In other word, it identifies the relationship between what an organization wants to do and how they are doing it. These excellence models highlights the eight fundamental concepts to achieve the sustainable performance excellence that includes adding value to customer, creating a sustainable future, developing organizational capability, harnessing creativity and innovation, leading with vision and integrity, managing with agility, succeeding through the talent of people and sustainable outstanding result[25]-[26]. The perfect blend of all mentioned concept helps organization not only achieve excellence but to sustain it as well, all concepts are considered as an ecosystem of EFQM as shown in Figure 1.5.

Joint Commission International (JCI) supports healthcare to improve patient safety and quality of healthcare internationally by providing education, training international publications, advisory services, international accreditations, and certifications. JCI partners with hospitals, clinics, healthcare centers, academic medical institutes, government entities and healthcare systems to promote the international standards of care and provide solution to maximize the performance [27]. This section described how the concept of quality of healthcare evolved over the

past few years and important components of healthcare ecosystem. Shed light on the recent awards, affiliations, accreditation and recognition of quality in healthcare. Next section intents to discuss the assessment tools used for the healthcare quality evaluation and their benefits.

1.6. Assessment of Quality of Healthcare

All factors that influence the healthcare quality from any of the prospects (clinical, non-clinical and patients) can be enlisted under the dimensions and assessment tools for healthcare quality. As these are category based on which healthcare quality can be measured, controlled and improved.
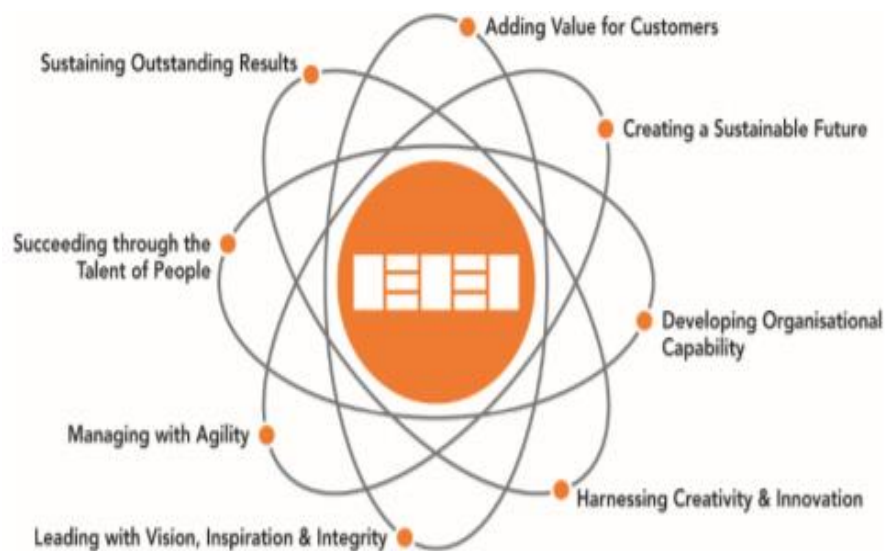
Figure 1.5: EFQM Eight Fundamental Concepts [26]

1.6.1. Dimensions of healthcare quality. In 2001, the IOM committee of Quality of Healthcare in America identified the six key dimensions of U.S healthcare facilities where improvement is necessary. The six dimensions of healthcare quality are illustrated below, the dimensions can fall in any relevant prospect but improving on one or more of these factors can affect the overall quality of the healthcare service provider[28].

- *Safety* Healthcare services do not harm the patient by giving them wrong medicine or by any other reason (negligence, unavailability of

medicine, unavailability of physician, etc.).

- *Effectiveness* Patients get benefit out of the treatment provided to them and treatment based on medicine knowledge. Safety and effectiveness are important dimensions from both service provider and patient perspective. No treatment should be provided that do not benefit the patient.

- *Patient-Centeredness Healthcare* service should be always respectful, responds to request, give preference to patients concerns and serve the needs of patient while making clinical decisions, patient and service provider both care of this factor.

- *Timeliness* Services are available when they are required, least delay or procrastinations upon the need of the patient.

- *Efficiency* Lean services should be provided to patients with less waste of equipment, supplies, time of service, idea, and energy, it is an important factor for the service provider in order to maximize the profitability and serve more people.

- *Equity* Service provider should treat patient with no discrimination upon age, sex, gender, demographic location and race, patients care about this factor and a considered as a crucial factor from patient perspective. The frameworks like IOM described above makes it convenient for customers to grasp the meaning and relevance of quality measures in healthcare[29].

In 2012 another exploratory study developed a conceptual framework of quality of care in health sector, the study illustrated more than 100 quality dimensions(See Appendix A)that determine quality of care which are further categorized under five main dimensions: efficacy, effectiveness, efficiency, empathy, and environment[30]. The study explored the quality factor from the perspectives of various healthcare stakeholders (healthcare professionals, clients, managers, payers, policy makers and accreditations) in Iran, by using statistical algorithms of data analysis, the study also represented a model to measure the quality of the healthcare center. Efficacy, Effectiveness, Efficiency, Empathy are grouped under an intangible

quality aspect whereas Environment is a tangible quality aspect. The model for quality measurement with the categorization of the tangible and intangible quality dimension are demonstrated in Figure 1.6. There are other tangible and intangible aspects that can be considered that the Figure 1.6 represents only five aspects.

1- *Efficacy*–It refers to the long-term outcomes of the healthcare provider and quality of life and patient's well-being. Under effectiveness this study categorized diagnosis time, care, treatment and all the desired outcomes related to the service provider perspective. Healthcare clinical expertise, physician knowledge and experience, in fact, physicians argues that patient satisfaction cannot be good indicator to measure the quality of care as patients lack at clinical knowledge to judge the quality of service.
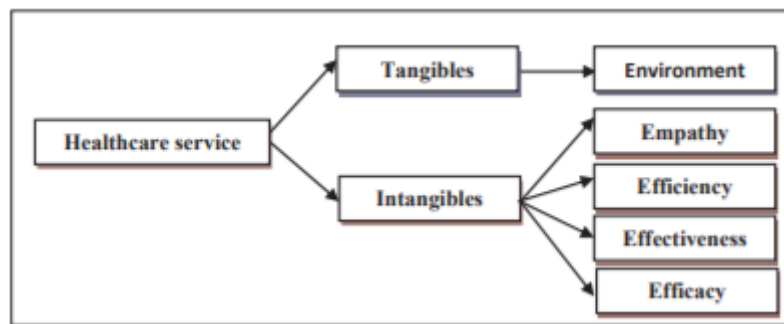
Figure 1.6: A model for quality measurement in Healthcare [30]

2- *Effectiveness* – the measure of outcomes short-term benefits of the overall hospital staff activities either from clinical staff or non-clinical staff. Under effectiveness this study categorized diagnosis time, care, treatment and all the outcomes desired by the patient. Patient satisfaction also taken into account as it is one of the most important factor from patient's perspective.

3- *Efficiency* - the measure of best possible use of available resources to achieve maximum results. Reduction in the wastage resource usage, optimize consumption and benefitting patient from the service.

4- *Empathy* - Patients consider it to be an important factor in terms quality of healthcare, as it relates to interpersonal attributes: feeling of being heard, trust, respect, confidentiality, courtesy, sympathy, responsiveness, helpful staff, compassion and strong communication between healthcare provider and the patient[30].

The set of dimensions that helps the healthcare providers to achieve the high level of quality and to understand the quality term in the medical word and aims to value the broader range of quality indicators.

1.6.2. Tools for the quality assessment in healthcare. The frameworks used to assess the quality within the organization are the same tools used for the quality of healthcare. Regardless of the framework or tool used for the quality assessment, the focus of all the frameworks are always upon these three categories on the measurement, assessment, and improvement. Quality Assessment Process is not a simple process but nearly similar in all organization, as well as in healthcare[3], in healthcare all the clinical and non-clinical operations involved day to day routine is analyzed, and linked to many factors in quality indicators. Figure 1.7 shows a general quality assessment procedure, the first step is "Measurement" it depends on how the measuring process is taking place in healthcare service, what are we measuring, what are the tools used for measuring. Next step is, "Assessment", the results of measuring process is up to the desired or expected results, if "No" move to "Improvement" and if "Yes" go back to "Measurement". "Improvement" involves what are tools, strategies and initiative we can take to improve the quality of the health based on the concerned quality indicators. After the "Improvement" process complete again go back to "Measurement" to measure the results and the process goes on repeatedly.

PDCA/PDSA cycle is a very common tool for the quality assessment in the healthcare sector. PDCA is a robust approach and allows a lot of flexibility to the user in terms of implementation and monitoring the results.
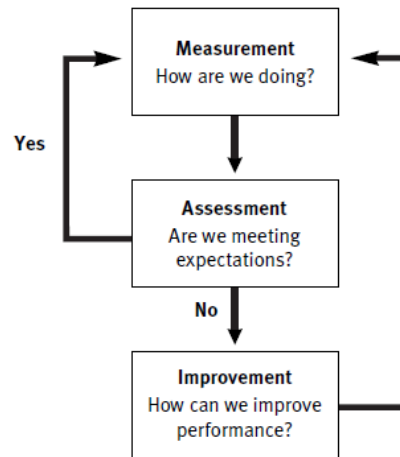
Figure 1.7: Cycle of Measurement, Assessment, and Improvement [3]

In 1988, Donabedian quality assessment framework is considered to be one of the strong tool used in the healthcare quality as shown in Figure 1.8 [21], in his framework Donabedian defined "structure" as an input to the system, all the tangible and intangible resources required for the provision of quality, such as equipment, facility, capital, expertise, medical knowledge and human resources etc. The "process" indicates what elements are delivered by using the resources, in terms of usage of resources it is further divided into patient related process (intervention rates, pattern of prescription, referral rates) and organizational aspect (management of drugs, salary of healthcare staff, funds collection, etc.). The last and final component is defined as "outcome" describes the results of healthcare treatment upon the patients and people. "Outcome" is further divided into long-term outcomes (mortality, morbidity, disability, etc.) and intermediate outcome (blood pressure, body weight, patient well-being, etc.).

These frameworks are used along with the statistical tools to give meaningful insights of the data collected and analyzed. Nowadays, variety of statistical tools (data analysis, data mining) available that provide the quantitative meaning of the data gathered and how to get beneficial information out of it. These types of analyses guide the higher management to set future goals, structure initiative for improvement quality, make the decisions based on quality management culture. This section entails

a detailed introduction of assessment of healthcare, factors that influence healthcare quality and tools used for the assessment. The next section briefly demonstrates the current practices of quality management.

Source: authors' own compilation based on Donabedian, 1988

Figure 1.8: Donabedian Framework for Quality Assessment in Healthcare [31]

1.7.   Quality Management Practices and Initiatives

Quality Management practices and initiatives are evolving with the passage of time. Several frameworks and concepts are integrated into the quality of care to enhance the efficiency and effectiveness of healthcare facility and deliver a high-end service to the patient. This section illustrates few initiatives purposed to implement or already implemented within the quality of healthcare around globe.

1.7.1.   Current practices of quality management in healthcare globally.
In mid-50s Japan initiated an excellence and performance models by awarding Deming Prizes to best healthcare service providers, later in 80s this practice is followed by the Malcolm Baldrige National Quality Award (MBQNA) and the European Foundation for Quality Management (EFQM) for excellence of healthcare. These models were still in practice by European hospital professionals to raise the quality of the service and used as a tool of continuous improvement. The Malcolm Baldrige model and European Foundation for Quality Management assess specific categorizes based on which awards are given out as discussed in previous sections. The main aspects examined in both the models are integrated in strategic planning, customer and market focus, measurement analysis, and knowledge management[32]. Accreditation is another quality improvement practice came into existence in 1910, it

is an external review of the quality, the principal component is justified by the literature and published standards of the quality of care, further reviews are done by the professional peer and these reviews sessions are administered by the external/independent body. Joint Commission International (JCI) is one of the oldest and well-known accreditations for healthcare providers. JCI considers a comprehensive quality management framework that considers quality leadership beyond the aspects set by the International Standards Organization (ISO). Accreditation is more beneficial than the excellence model as it focuses on each component of healthcare and specifies the area where there is a need of improvement (Accreditation will be discussed in detail in later section). Evidence based medicine (EBM) in quality improvement practice introduced in 2011, collaborate the individual clinical expertise with the best available clinical evidence from systematic research. Evidence may include literature, research, experimentations, peer reviews and standards from medical authorities etc. Lean management and six sigma approaches are also used for quality improvement in healthcare as discussed in previous section 1.4.

1.7.2. Important definitions in healthcare quality literature. There are many organizations working to raise the level of quality in healthcare, continuous improvement is a key to raise the contentment across patient and employees of the healthcare center. There are many important terms that are used within the quality framework, and healthcare performance concepts. Many organizations presented the quality definition and quality terms differently, based on their research results, findings and analyses. The important definitions used in the study are based on the WHO Healthcare Systems Strengthening Glossary [33]. Next section entails the industrial models used for the quality assessment in healthcare.

1.7.3. Industrial models for quality assessment applied in healthcare. The quality improvement practices used to ensure the high-quality service in the healthcare center, are developed by using different models and frameworks. The models that are used for the development of quality initiative and current practices utilizes sophisticated tools, extensive research and industrial validation before applying it to healthcare facility.

1.7.3.1. *Servqual model*. Servqual is another tool to assess the quality of service, there are not many examples available for the application of this model on physical product and best suited for the service delivery. The model captures the tangible and non-tangible aspects of the service and assess the gap between customer expects from the service and what they receive. There are originally 10 main dimensions usually assessed for the service including reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding/knowing the customer, tangibles[34]. The Figure 1.9 represents the common model of Servqual used for the healthcare quality assessment.
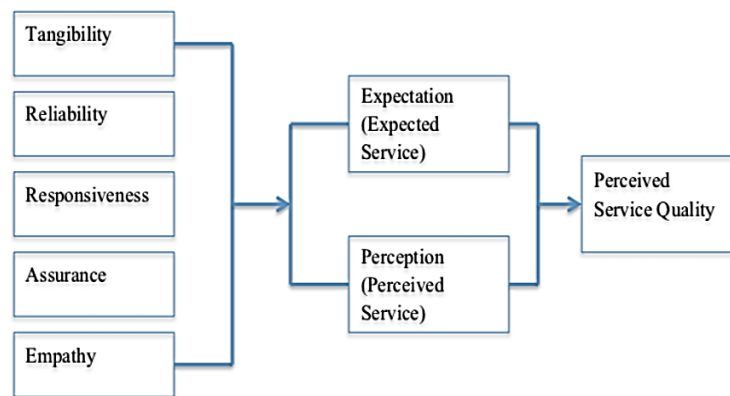
Figure 1.9: Servqual Model [35]

1.7.3.2. *Walk through audit*. Walk through Audit (WTA) is a tool that examine the entire journey of service received by the customer and identify the gap of perception between different involved stakeholder on each process of the service. WTA is a visual assessment and observation process and employee's contribution, how they usually run the facility. It is a tool used for a detail evaluation and begin with designing a flowchart of customer interactions with the service system. Every step in the customer journey from walking into the facility until leaving are accounted in the examination. The are many advantages of using WTA survey within the workplace as it shows the whole picture of the operation and the process. It helps in risk assessment, risk prioritization, identification of hazards and aids in approaching them in a structural manner [36].

There are many examples of using this tool in tourism, restaurant, banking and other industries, however, WTA is not widely used in healthcare quality assessment until now but it has many applications in other industries [37].

WTA is developed by using two-level dimensional assessment, level one is to understand what are the key factors that affect each step of the process and level two is the actual question about the action performed or the operation that need to be evaluated. A sample WTA of a security company is shown in Table 1.2.

Table 1.2: Sample Walk Through Audit (WTA) Question

SECURITY WALK-THROUGH CHECKLIST			
EMPLOYEE CONDUCT	**Yes**	**No**	**Comments**
Employees and visitors wear ID badges.			
Employees challenge persons who are not wearing badges.			
Employees protect security of PHI by speaking softly and, when appropriate, using nonpublic areas.			
WORKSTATION USE	**Yes**	**No**	**Comments**
Workstations and computer monitors are positioned to prevent unauthorized persons from viewing EPHI.			
Employees protect user IDs and passwords, and don't share them.			
Employees don't share workstations while logged in.			
User IDs and passwords are not posted on or near workstations.			
All computers are shut down after hours			
ACCESS CONTROLS	**Yes**	**No**	**Comments**
Access to computer room is restricted to authorized personnel.			
Access to fax machines and printers is limited to authorized staff			
Office doors, filing cabinets, and desks are closed and locked when unoccupied.			

1.7.3.3. *Kano's model*. Kano's Models is a well-known quality management and assessment model in practice since 1980's, Professor Noriaki Kano presented a framework that describes the relationship between product development and customer satisfaction to help organizations identify the customer preference and requirements. Kano's Model is being used in various industries around the world. Kano model segments the product features and attributes based on the customer's level of satisfaction towards the feature and divide them into three categories [40]-[41], shown in Figure 1.10.
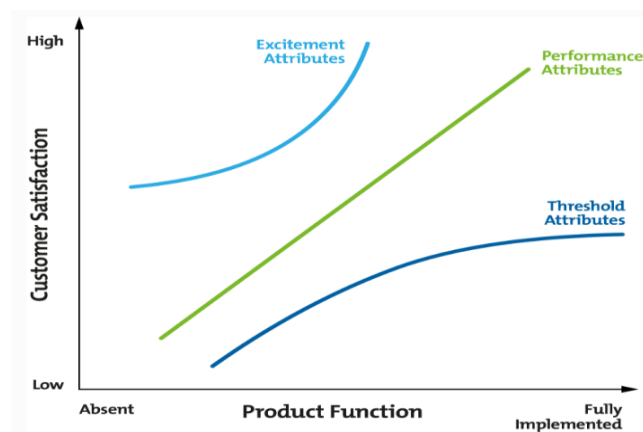
Figure 1.10: Kano's Model [39]

Kano's Model has three main attributes based on which the quality is been assessed, Threshold Attributes, Performance Attributes and Excitement Attributes. All these attributes are explained here:

1. *Threshold Attributes*: Threshold Attributes that must be available in the product or service and represented by the lower most curve in Figure 1.10.
2. *Performance Attributes*: Performance Attributes that are not necessary, but it improve the user's experience and represented by green line in Figure 1.10.
3. *Excitement Attributes*: Excitement Attributes that distinguish the product or service from their competitors and add an essence of surprise for the customers.

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Griffin and Hauser presented (Sauerwein et al., 1996) a unique model and customer satisfaction can be measured by using a five-step process as follows [40]:

- Identify the product/service requirement.
- Develop a two-dimensional questionnaire that is consist of product/service functional and dysfunctional feature assessment. Each pair of question have both question function and dysfunctional question as shown in Table 1.3.
- Implement the customer survey and customers are requested to evaluate each question at Likert scale.
- Perform the analysis and interpret the results

Kano's Model and the plot of attributes are shown in the Figure 1.10 and the sample functional and dysfunctional questions are only shown in Table 1.3.

Table 1.3: Sample Functional and Dysfunctional Questions

Functional (positive) form of the question

| If the edges of your skis grip well on hard snow, how do you feel? | 1. I like it that way.
2. It must be that way.
3. I am neutral.
4. I can live with it that way.
5. I dislike it that way. |
| If the edges of your skis do not grip well on hard snow, how do you feel? | 1. I like it that way.
2. It must be that way.
3. I am neutral.
4. I can live with it that way.
5. I dislike it that way. |

Dysfunctional (negative) form of the question

1.7.3.4. *Total quality management (TQM).* TQM is an approach to a long-run success through customer satisfaction, all the components of organization work together in the process of improvement for services, product and even the

integrals structure such as culture [25]. There are eight important dimensions of TQM model: customer-focused, total employee involvement, process-centered, integrated system, strategic and systematic approach, continuous improvement, fact-based decision making and communications. This section explains the popular models used for the quality improvement in healthcare, next section describes the recent studies and trends of quality of healthcare.

1.8.   Problem Statement

Healthcare is a basic need and most concerned facility in terms of quality as human life is on stake. There are many organizations working eagerly to improve the quality of healthcare and provide better service through reducing discrepancies in treatments. A report published in the collaboration of WHO, OCED and World Bank in 2018, states that "The Sustainable Development Goals (SDGs) reaffirm a global commitment to achieve universal health coverage (UHC) by 2030. This means that all people and communities, everywhere in the world, should have access to the high-quality health services they need – promotive, preventive, curative, rehabilitative, or palliative – without facing financial hardship"[41]. UAE is always being an attraction for businesses and tourism, but now UAE government wants to boost the medical tourism and establish Dubai as a center of healthcare excellence in the MENA region [42].

The quality of healthcare service has evolved since the past few decades and despite of the various quality initiatives that are practiced for improving healthcare facility in different parts of the world, still there are number of evidence spread across that raise many questions on healthcare quality management globally e.g. In many developed countries, 1 in 10 patients is adversely affected during treatment, 7 in 100 hospitalized patients are expected to acquire a treatment-associated infection which can be eliminated through better hygiene, while in developing countries this figure is 1 in 10 patients [41].

Quality of healthcare had a long journey to reach where it is today but the gap between the patient's needs from the healthcare services, the administration's take on it and the clinical staff voice on healthcare quality still exists. The root cause of this gap is due to the difference in the perspectives of healthcare quality, perception of

quality from healthcare management perspective can be different than the patient perspective while clinical staff may have different say over it. The existing quality practices accounts from the hospital management and the clinical staff perspective while patient perception is neglected. WHO states that patient-centered care is a key to the step towards the quality improvement, appropriate utilization of resources and clarity on the guidelines for further quality improvement practices of delivering effective healthcare[43].UAE missions to develop a world-class healthcare by 2021, and it's one of the six pillars of the UAE's National Agenda in its Vision 2021. DHA Government bodies are keenly working towards the public-private (PPPs) to the serve the purpose, and until January 2019 eight successful MoUs has been signed with private hospitals to exchange expertise with public hospitals[44].

It is an important aspect to integrate patient's perception into quality improvement practices in healthcare, this study intends to collaborate different perceptions about quality from all the important contributors of healthcare system into one tool, develop a multi-dimensional framework of quality improvement and validate it at different hospitals and healthcare centers.

1.9. Thesis Proposal Objective

The objective of this study to develop a theoretical framework to propose an optimized quality improvement framework that improves quality for three main contributors of healthcare, non-clinical staff (administration, payers, stakeholder and management), clinical staff (Physicians, Nurses, Lab Assistants) and patients (outpatient & inpatients) along with catering the major shortcomings of the healthcare practices/initiative. The study represents a multi-dimensional framework to incorporate the concerns of value creation, value delivery and value consumption in to one framework using Confirmatory Factor Analysis (CFA) and suggest the results at healthcare facility to improve healthcare service quality.

1.10. Research Contribution

The contribution of this study is the integration of the patient perspective into the quality improvement of healthcare industry, as there are many initiatives currently in practice to serve the purpose but very few addresses the patient perspective along with healthcare management and clinical staff of quality in healthcare. This thesis

work can be used at healthcare facilities to have an informed decision in quality improvement practices from all major contributing stakeholders (healthcare management, clinical staff and patient). Data has been collected from real healthcare facilities and patients, analysis has been performed on the data and important dimensions of the healthcare quality has been identified. Due to covid-19 situation the collected dataset is very small as of the medical emergency in the state, the results of the study have not been validated from a working healthcare facility.

1.11. Thesis Organization

Chapter 1providesa brief overview of quality, quality in healthcare, its determinants, assessment frameworks and problem statement of the study. Chapter 2 sheds light on the current practices of quality management, its shortcomings and major the gaps of quality improvement in healthcare. Chapter 3 explains the research methodology to be used to achieve the objective of the study and timeline of the study. Chapter 4 covers results of study and finally, chapter 5 provides conclusion and recommendations based on findings.

Chapter 2.   Healthcare Quality Research and Trends:
A Literature Review

Healthcare experts are eager to serve well-equipped facility to mankind that triggers the crave of the continuous quality improvement. There are number of new research and trends being presented from the past decade and shown a significant progress in healthcare services from the past few years.

2.1.   Recent Research and Trends

In study published in 2013, a theoretical study is developed to understand the original essence of quality management in healthcare. The study argues that the Total Quality Management (TQM) concept cannot be migrated into healthcare from manufacturing industry, a pilot run was done in the 80s, but it was not a successful model in the healthcare sector, as healthcare sector have a complex infrastructure, highly departmentalized environment, multi layers of authorities and tensions between the managers and professionals. Several other barriers include, lack of higher management support, lack of employee's engagement, insufficient resources, lack of a quality-oriented culture, inadequate education, training and lack of communication. This study presented a detail literature review of Strategic Collaborative Quality Management (SCQM) model, the model is developed by seeking feedback from the experts through Delphi Method. The analysis of the study also utilized qualitative tools (semi-structured interviews) with healthcare stakeholders and experts[45]. This study discussed that the healthcare industry is a different industry from other business industries with unique demands and needs, so a proper model of quality management should be implemented and a guidebook for the implementation of SCQM is purposed along with its complete roadmap to achieve quality excellence in healthcare sector.

A public report published in 2015, indicating the improvement in quality management of one of the largest healthcare service (Centers for Medicare & Medicaid Services (CMS)) providers in United States, proposed a Physician Quality Reporting Programs Strategic Vision (or "Strategic Vision"), illustrates a long-term vision for CMS quality improvement and how CMS can be optimized and support better decision-making from physicians, doctors, patients and everyone involved in the healthcare ecosystem. This initiative aims to integrate all parts of the healthcare

into one place to encourage the continuous improvement in the delivery of care and transferring information to the consumers. The report articulates the five principles to ensure the quality of care is measured accurately and improved quality healthcare facility provided to the citizens. The vision statement used an inputs from patients, caregivers, and healthcare professionals to guide the program, take their feedback, opinions to create a data driven rapid cycle of quality improvement[46]. The factor of public reporting of the initiative provides transparent, meaningful and actionable information to the consumers and to people with less medical knowledge. A proper measurement framework or tool is used to measure the performance otherwise the quality reporting will not be a beneficial practice. The desired outcome of this strategic vision is to develop a future aspect of how to administer quality of the healthcare and physician quality reporting programs. The strategic vision aims to develop a high level goals and objective for quality improvement indicators highlighted in Quality Strategy[47] through quality measurement and reporting programs [46].

After five years in 2017, an exploratory study in Saudi Arabia implemented the existing TQM practices on the Saudi public hospitals to improve the quality of care, efficiency and productivity, and patient satisfaction. As Saudi Arabia do a large amount of an investment on healthcare each year but didn't get the results accordingly. This research work is conducted at two well-renowned public hospitals in the capital city, Riyadh, Saudi Arabia[48]. The Study illustrated a mixed approach to investigate the implementation of the TQM practices on healthcare quality. Qualitative approaches (semi-structured interviews) are conducted with the head nurses and TQM managers whereas a questionnaire (quantitative approach) is used to gather information from patients and nurses to have more clarity on how customer's requirements are growing and what the healthcare facilities are providing.

The analysis of the study revealed that the implementation of TQM improves the quality of healthcare, depends on seven main success factors of TQM, effective communication, employee training, and transformational leadership, staff motivation, measuring the performance, level of understanding and improving patient needs in the healthcare industry. The study is tested at three major levels of healthcare providers which include governmental level, managerial level and operational level to validate

the results of the study[48].

Another study in Canada presented in 2019, aims to structure an initiative to have a patient partnership in quality improvement (QI) process, and involving patients into QI assists the managers to have guided decisions for the quality of healthcare centers and give more visibility to management, what patient's need in order to maximize the patient satisfaction. A theoretical framework is represented by using multi-level case studies method, conducting qualitative and quantitative analysis that helps the healthcare organization to successfully establish the patient partnership approach, structuring patient partnership support, and managing the entire integration of patient's opinion into the quality initiatives of the healthcare. The purpose of the study was to engage patients into the managerial decisions and increase patient's partnership into QI of healthcare through training and course curriculum available at academic institutions, such as in schools of public health, nursing schools, and schools of management[49].

One of the very important studies published back in 2016, aims to explore the importance of quality dimensions from all the involved stakeholder's perspectives of healthcare system. The methodology of the study is to perform an importance and prioritization exercise of quality aspect with patients, healthcare management and clinical staff and develop an initial four-dimensional framework based on Donabedian framework of quality assessment. The four-dimensional framework is shown in Figure 2.1.

A Structural Equation Model (SEM) was used for statistically validation of initial framework and determine the strength of relationships among the dimensions. The data drawn from this initial survey were inputted to the SEM software, wherein the third-level dimensions of the proposed framework were used as the latent variables of the model and the fourth-level dimensions as the observed variables. SEM confirms that proposed dimensions shows a significant relationship with their respective indicators and assures the validity of the hierarchical framework[50]. The framework is also validated by taking in-depth interviews with all the stakeholders. Finally, this framework is implemented in one of the private hospitals in Philippine and concluded that there are two important service dimensions that influence the whole service quality structure. The administrative service of a healthcare centre and

equipment facilities are the dimensions within a service system that can highly dictate the quality of the other dimensions under the service structure, process and outcome.
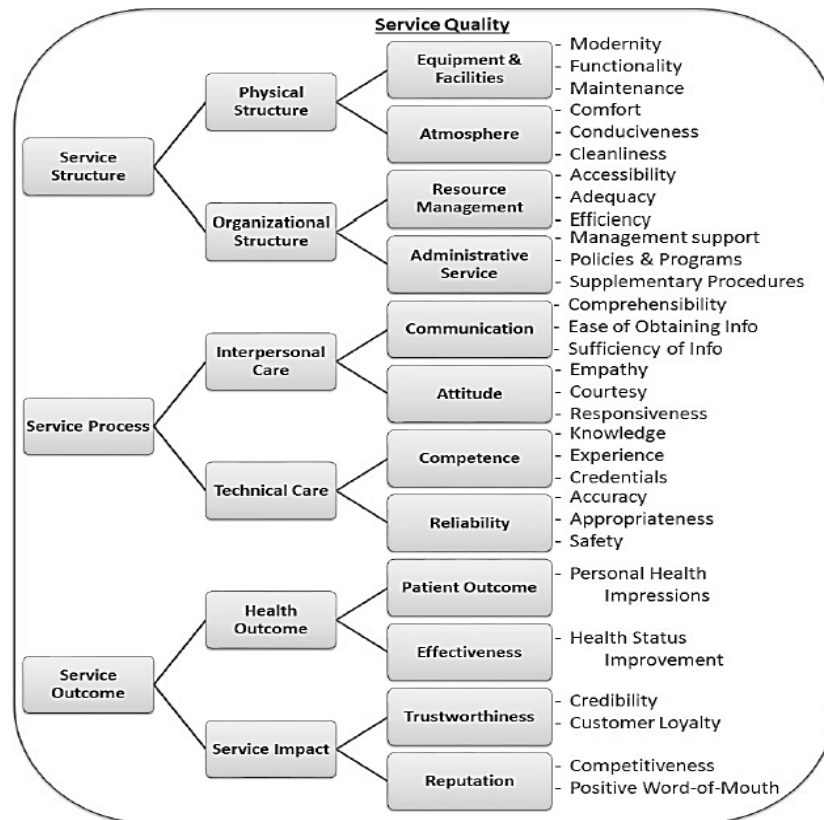

Figure 2.1: Initial Four-Dimensional Framework [50]

Another study investigated an overall customer satisfaction through integrating Kano's Model into the healthcare performance and identify relationship between the customer satisfaction and the current quality performance outcomes. The study uses a Statistical Equation Method (SEM) to analyse the data, collect from 1100 patients, and describes the performance of a healthcare from patient's perspective. The results of the study reflect that the must, one-dimensional and attractive attributes had a direct effect on customer satisfaction level. However, the customer loyalty shows linear relationship with customer satisfaction and inversely proportional to the number of complaints of the healthcare centre. The study also depicts that the segmentation of attributes increases the customers satisfaction and loyalty [51].

A study published in 2013, aims to examine the healthcare quality at one of the

women centered hospitals at local city and understand the main reasons behind the lack in quality. They used to walk through audit (WTA) tool that consist of 25 questions about the entire journey of patient visit at the hospital. The study concluded that there are different perspectives involved in the healthcare quality due to which they presented generalized results that technical quality is competitive and functional quality is less competitive[52].

2.2. Quality Improvement Organization (QIO)

A Quality Improvement Organization (QIO) is a group of health experts, physicians, and consumers organized together to improve the quality of healthcare provided to people in United States of America. QIO Program is one of the largest and renowned federal programs structured to improve the health quality for Medicare beneficiaries. It is an integral part of the U.S. Department of Health and Human Services (HHS) and National Quality Strategy for providing better healthcare facility at low prices. The function of this initiative is to improve quality of care for beneficiaries, protecting the integrity of the Medicare Trust Fund and protecting the beneficiaries expeditiously from filing any kind of individual complaints, such as appeals, violations of the responsibilities as articulated in QIO-related law. There are two types of QIOs programs run under the directive of CMS support for QIOs program: Beneficiary and Family Centered Care (BFCC)-QIOs and Quality Innovation Network (QIN)-QIOs, both programs have different directives to ensure the quality of care provided to the end consumer. CMS redesigned the QIO Program after every three to five years to further enhance the quality of services for its beneficiaries. The new program structure aims to be an improved version of the previous program while maximizing learning and collaboration in improving care, supporting the effectiveness of new practices and frameworks of care and provide support to achieve the priorities of the National Quality Strategy and the goals of the CMS Quality Strategy, and ensure the quality program is delivered to beneficiaries, patients, and taxpayers [53].

2.3. Shortcomings of Current Practices and Initiatives

The healthcare industry is always growing rapidly to provide people with the best quality service and make people's life easier. Despite of the initiatives being

taken to improve the quality of healthcare; healthcare industry is still lacking on many aspects. The initiatives and current practices adopted to improve the quality of healthcare may not consider the quality perception from patient's perspective or neglect the clinical/non-clinical perspective or vice versa. This section aims to explore the shortcoming in healthcare quality management in both undeveloped and developed countries.

A study performed in 2013 in Jordan, aims to identify the major struggles of healthcare initiatives implementation. The paper briefly discussed few initiatives were taken earlier to improve the quality of healthcare yet no succeed to achieve the desired quality level within the healthcare center. A detail literature review of different initiatives implemented in history including EFQM, TQM, Lean management, Evidence-Based Medicine (EBM) and Six Sigma approaches of the quality improvement are being discussed. The quantitative approaches of structured questionnaire were being used and filled out by 30 representatives at 18 different hospitals to identify the key issues involved. The findings of the study identify that there are number of factors that hinders the quality improvement initiatives, few of them were lack of higher management commitment, training of nurses and staff, quality personnel quality culture, and morale of employee. Trained physicians are an asset to the healthcare center so their response towards the initiative is also accountable for its execution. The study also revealed that nature and complexity of implementation of the initiative, understanding the new initiative and how it is implemented plays a vital role in adoption of the initiative[54]. Evidence based method (EBM) is not widely practiced due to its limitations, no systematic approach (physicians apply it in different ways based on their own understanding), it is based on different research in different parts of the world. Despite of the fact that the treatment effectiveness was higher than the routine clinical practices, but close examination of the patient lose the essence of the practice due to higher compliance rate. The research work used for the treatment may not include all research done on that topic and it may be unreliable due to conflicts of interest between the researchers.

An international study presented in 2014, by Commonwealth Fund International Health Policy Survey of older adults conducted a formal study to shed light on the shortcoming in accessing healthcare facility, coordination and patient's-

centered care. A qualitative analysis, telephonic interviews conducted with 55 older adults in 11 different countries same questionnaire is used for all the calls. The study considered age group of sixty-five or older in Australia, Canada, France, Germany, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States. The results of the research revealed that the low positive responses for care accessibility, the primary location is too far for the older adults and cannot be easily accessible. Care Coordination is another important factor that include test reports are not available on the scheduled appointment and a long process for patient admission and discharge etc. that cause inconvenience to patients. As older patients are keen to be heard out and expect response for every question, a friendly doctor patient relation is an important factor towards healthcare quality, but many healthcare centers are also lacking on patient centered approach. Accessibility to primary healthcare center is more difficult in United States, Canada and Sweden than other countries of the studied[55]. More than one-fifth of the respondents claim that they are receiving uncoordinated care from the available healthcare in all countries except France. In the end, the United States older adults have showed health-promoting behaviors with physicians, to have a chronic plan according to their routine life and have more engagement in end-of-life planning. The study concluded with the major finding that approximately in half of the examined countries, more than one-fifth of the adult care providers need improved healthcare facility[55].

After two years, a cross-sectional study performed at Kerman Medical Sciences University (KUMS), Iran, published in 2017, aims to measure the performance of the healthcare to guide the policy makers and managers to improve the current services while maximize the patient satisfaction. A descriptive analysis is conducted and by using cross-sectional method within the KUMS training hospital in a span of October 2014 to March 2015. Importance-Performance Analysis is used for data collection through questionnaires, through stratified random sampling of 268 patients, the current performance of the healthcare center is measured, and importance of patient's perspective is considered. The study revealed that there is a significant gap between the importance and performance of the service. From patient's perspective the tangible dimensions of service are highly important which includes (clean physical environment, modern equipment, easy payment process and

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cleanliness), reliability of the service is one of the most important performance factors. The study suggested to put more resources on the tangibility of the healthcare service will help the healthcare to maximize the patient satisfaction and quality from patient's perspective[56].

Another study presented in 2018, concerns with evaluation of the performance of the national healthcare systems in 32 European countries as of 2011 – 2014. The paper presented a two-dimensional approach efficiency verses effectiveness model, data envelopment analysis (DEA) is used to measure the efficiency and effectiveness of these healthcare systems. The study revealed that there is a huge gap between the efficiency and effectiveness of the healthcare service provided in different part of Europe and no trade-off evident between the performance indicators. The countries like Irish, Sweden and Portugal have the most efficient healthcare systems, whereas Lithuania, Norway, Switzerland, Germany and Austria lack in resources (doctors, nurses, healthcare assistants and available beds in hospitals per capita) than others in Europe. Adding more resources could be beneficial and may improve mortality (death rate) and morbidity (disease condition) rate. The study reported that few countries of Europe (Ukraine, Bulgaria, Switzerland, Lithuania, and Romania) need to practice healthcare reforms with reduced resources and increase in the quality of services[57]. The policy makers should identify the shortcomings in the national healthcare services and justify the requirement of their reforms.

A study presented in the same year (2018), highlighted the major struggles of the healthcare systems, the study identified the major organizational/service factors linked with the struggles of the healthcare services in USA and categorize them in actionable domain. A qualitative data has been collected from different healthcare service providers, analyzed using framework-based synthesis and articulated into key factors. In the study thirty-three articles from different countries along with many interviews are being conducted, the interviewee includes nurses, clinical staff and staff from higher management. The study revealed that there is minimum healthcare quality improvement system are initiated with a focus on quality factors of the healthcare from clinical perspective, the struggle of insufficient staffing and lack of resources is one of the major issues. Other issues include underdeveloped information systems and electronic health recording systems for patients, all these factors affect

the healthcare services and optimal care provided to patients. The study proposed that identifying and understanding those struggles and challenges can be an initial step to support the healthcare improvement initiatives[58].

Table 2.1: Inadequacy of Initiative and Practices in Quality of Healthcare

Title	Published	Perspective	Shortcomings of Healthcare Initiatives and Practices (Key Points)
Implementing quality initiatives in healthcare organizations: drivers and challenges	2013	Healthcare Perspective	✓ Higher Management Commitment ✓ Nature of Initiative/practice ✓ Training of Staff ✓ Physician response to initiative/practice
International Survey of Older Adults Finds Shortcomings In Access, Coordination, And Patient-Centered Care	2014	Patient	✓ Accessibility to Healthcare Center ✓ Care Coordination ✓ Patient Centeredness
Evaluating health service quality: using importance performance analysis	2017	Patient	✓ Tangibility Dimension (Environment, Modern equipment) ✓ Service Reliability
Efficiency VS Effectiveness: A Benchmarking Study on European Healthcare Systems.	2018	Healthcare Perspective	✓ Gap in efficiency and Effectiveness ✓ Lack of resources
Characteristics of healthcare organizations struggling to improve quality: results from a systematic review of qualitative studies	2018	Healthcare Perspective	✓ Minimal Quality Improvement Systems ✓ Lack of Resources (staffing) ✓ Underdeveloped IT structure

From the above studies, major shortcomings in recent healthcare systems has been found, the healthcare facilities are evolving day by day but still struggling with the number of issues and setbacks. The major shortcomings of the healthcare quality are listed in Table 2.1, the shortcomings and problems may also vary with different perspectives and point of view, this section aims to discuss shortcoming from the three main perspectives involved in quality of healthcare (Clinical, Non-Clinical & Patient).

2.4.   Research Gap & Thesis Objectives

From an extensive literature review (in section 2.1 and 2.2) it is revealed that most of the studies addresses one or two stakeholder's perspectives to elevate the quality of healthcare. Only one study found that aims to investigate the quality dimensions which are important for all three perspective and presented a general conceptual framework. There are few gaps lie between the quality perspectives, from a hospital point of view (Clinical and Non-Clinical) and patient point of view. At this point, it is crucial to perform detail investigation of this gap and purpose a tool/instrument that elevate the level of quality for all the stakeholder involved in the healthcare system.
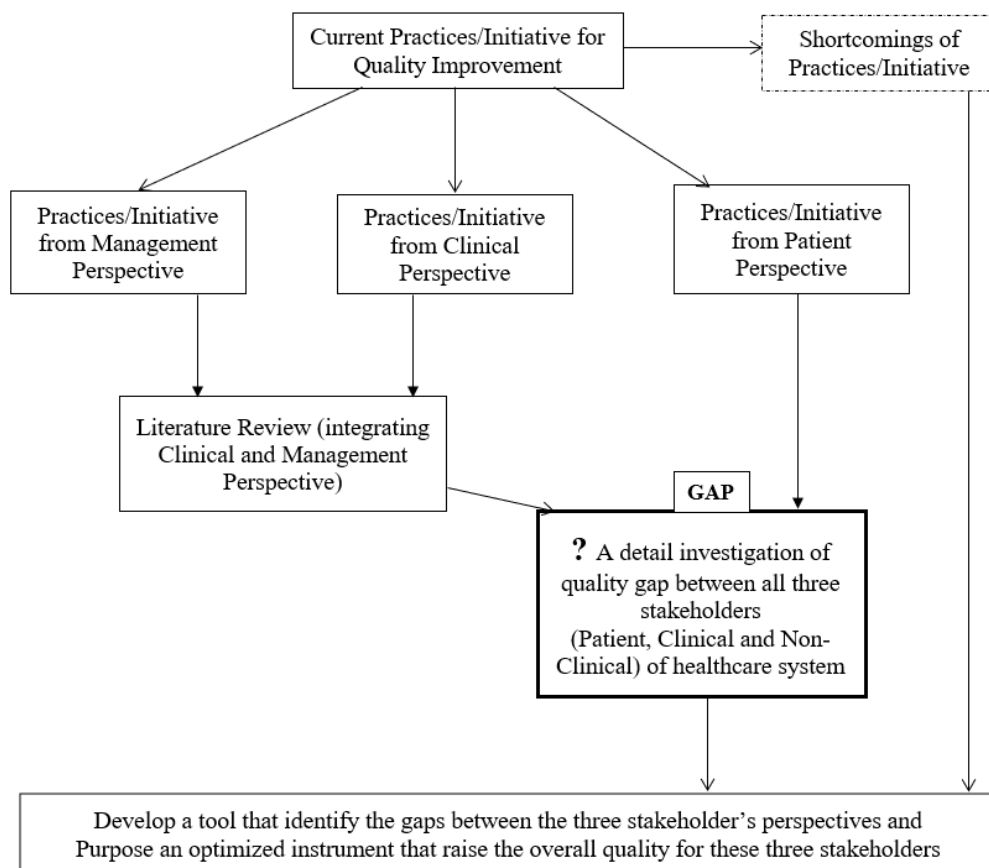

Figure 2.2: Research Gap Flow Chart

The flowchart in Figure 2.2 shows that different initiatives taken in healthcare for the quality improvement depends upon different perspectives and quality

improvement from one or two perspectives are not quite beneficial. In most healthcare quality improvement processes clinical and non-clinical perspectives are integrated together but integration of patient's perspective in quality improvement structures is being neglected. The proposed theoretical framework from detailed literature review is presented here in section 2.5.

2.5.   Proposed Theoretical Framework

The proposed theoretical framework based on the literature review is shown in the Figure 2.3. The framework shows all the important dimensions for creating service for the patients and delivering service. Major Division of the Framework Depends on:

1st **Division** of the attributes based on the Service Creation Attributes and Service Delivery Attributes.

2nd **Division** based on the Donabedians Conceptual Model for examining Healthcare Service in terms of (Structure, Process and Outcome) [58].

These two divisions are further dissected into three dimensions:

1st **Dimension** states the aspects that are directly related to the structure and infrastructure of healthcare Service for value creation and the look and feel of healthcare facility and other facilities to deliver the service. In terms of processes of healthcare services, staff well-being, technical aspects, lean management on value creation side while interpersonal aspects, benchmarking, technology, and risk/ emergency management are on service delivery side. For outcome of healthcare services, there is no related service creation factors while in terms of service delivery patient satisfaction, health status of patients and service impact on patient are analyzed. This dimension represents latent variables.

2nd **Dimension** states the aspects that are directly related to the Structure Infrastructure and, look & feel of healthcare facility and narrow down further what factor need to access. Same for process and outcome of the service quality as shown in figure 14. This dimension represents latent variables.

3rd **Dimensions** are the observed variables, and these are directly measured factors under each refined dimension.

Quality management in health care is a very significant requirement in the

health care sector. Organizational structure in health care is commonly known as the functional organizational structure that defines the operations carried out in the healthcare systems and the management resources which are allocated to those operations. Simply the levels of management are demonstrated by the organizational structure. These levels enable top management to manage the departments of the hospitals efficiently. These departments are assembled to encourage the effectiveness of the faculty[59]. The most common group is administrative services who must supervise the budget and finances and develop the policies for the system.

Multidimensional decisions involve the decisions with the involvement of both patients and the physician. Decisions by physicians involve the formal decisions about the health of the patients, and the involvement of patients in the decision process helps to enhance their knowledge about their diseases. It also encourages the engagement and collaborations between physicians and patients.

The physical structure of health care is also very important as it includes the equipment used for the treatment of the patients and the facilities provided for the wellbeing of the patients. This equipment is used by doctors and nurses to diagnose, monitor, and treat patients. Facilities are also included in the physical structure which involves the dental facility, ward facility, lab services, ECG services, pharmacy, and many others which are very necessary for the health care system. The environment of the hospitals should be clean and comfortable for the patients as well as the employees to increase productivity [60].

The well-being of the staff is related to all the aspects of their working life. It includes the safety and quality of the workplace environment, how workers feel about their job, and many others. The well-being of staff helps to increase their job satisfaction, and this can be done through their training and by developing their skills [61]. Development of staff can be done through various training sessions in which they get the chance to improve their skills and provide them the pleasant communicative environment which helps them to collaborate, and the depression related to their job's decreases. Technical aspects in the process of the health care systems are very important as it leads to the accuracy and appropriateness of the whole procedures followed by the physicians or other staff. This appropriateness will come through the implementation and demonstration of knowledge and skills by the

staff and the physician which shows their competency level. Physicians must use accurate measures for the treatment of the patients to improve their health and well-being. Also, the ability of staff to raise concerns about their jobs can be handled through reliable and accurate measures.

Lean Management is the set of policies and processes that is required to develop the optimum value for the patients through lessening the wastes and waits. The management of lean focuses on the requirements of the patients, involvement of employees, and nonstop improvement.

The detail view of both sides service creation and service delivery is shown in the Figure 2.4 and Figure 2.5. The detail service creation side of the framework is shown in Figure 2.4. The labeling of the framework will be shown in Chapter 3.

Management of health care waste is very important as it includes the waste of transport and inventory. Lean management also includes the strategies for the continuous improvement of the products and processes which leads to sustainability in the health care systems[62]. The detail Service delivery side view is shown in Figure 2.5. The labeling of the service delivery side will be shown in Chapter 3.

While interacting with patients or with the staff, interpersonal skills are very significant as these aspects including the effective communication and behaviors of the staff and physicians with each other. Effective communication is necessary for the exchange of information between nurses and doctors and between patients and doctors.

Effective communication is necessary for the exchange of information between nurses and doctors and between patients and doctors. Without effective communication, the risk of exchange of wrong information arises which ultimately leads to danger to the patient's life [63].

Benchmarking in health care is related to the metrics of the performance of the hospitals and then their comparison with the standard of performance metrics which us establishes by similar organizations. In short benchmarking is used to learn the level of performance and is improved through accreditation and by taking care of the standardization and the customization. improvement programs must be organized for the staff and nurses to increase the level of performance according to the standards of the world health organization[64].

Technology is a significant aspect used in used for database records of patients, nurses, and ICU. Technological advancements may also be used for the treatment purpose to improve the health of the patients. The new technologies like testing procedures, diagnosis of diseases and other new innovative technologies for treating patients also enhances the quality of health care services.

Emergency management helps to lessen the risk of emergencies by making sure the availability of the equipment and facilities and by increasing the number of medical staff to deal with the emergencies[65]. Through appropriate processes used in the healthcare systems, the health outcomes of patients become very effective and better than before. The health of the patients would be increased through using efficient processes for the diagnosing, treatments, and monitoring. This ultimately leads to the improvement and effectiveness of the health status of the specific health care system. Impact of the services by the staff, nurses, and physicians in the health care systems increase customer loyalty and their trust. The consequences of increased credibility and customer loyalty are to gain a competitive advantage in the health care sectors. The positive impact of services also leads to positive word of mouth which is defined as the positive suggestions about the system[66]. This helps to increase the effectiveness of the health care systems in the health care sector.
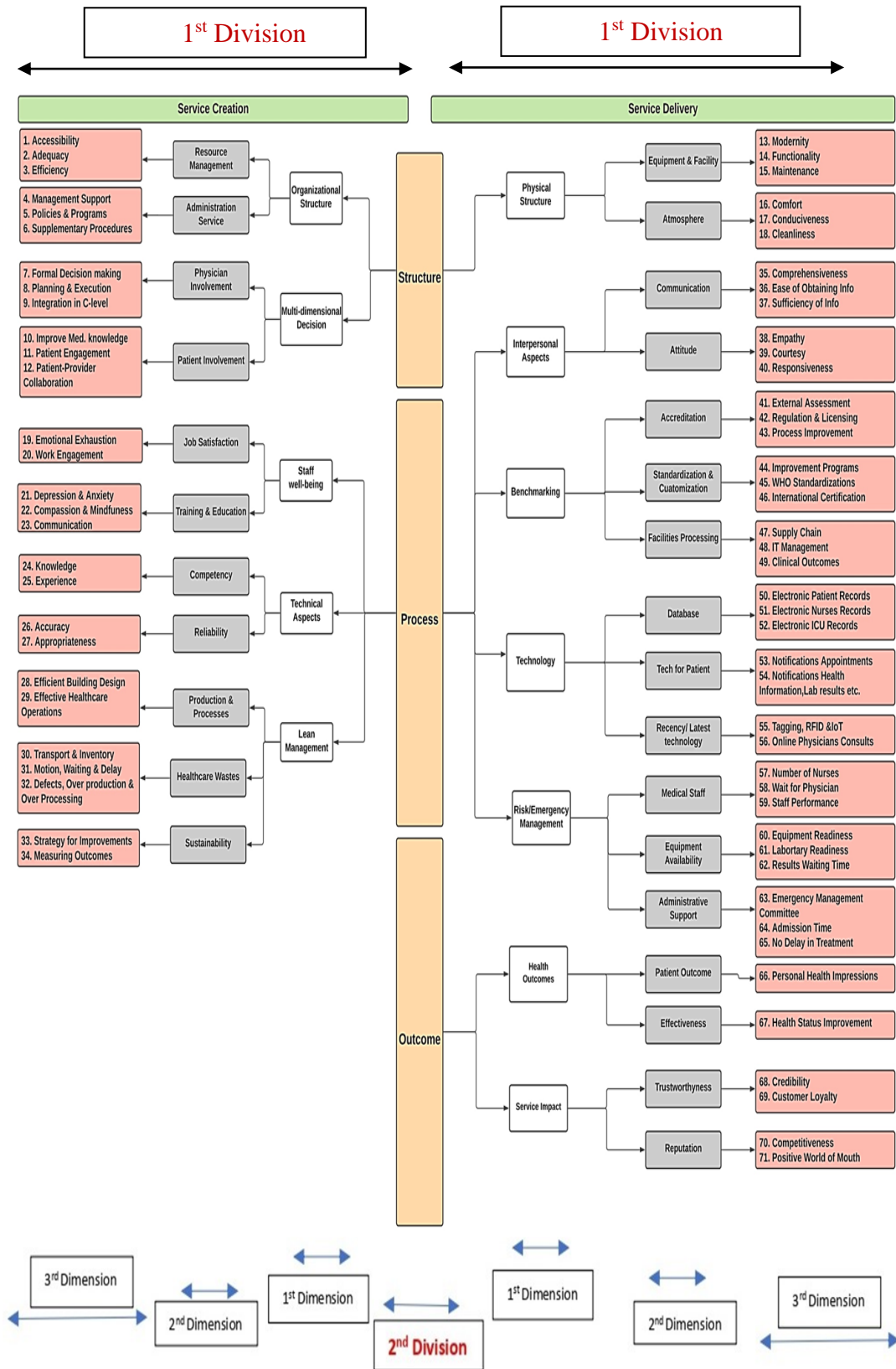
Figure 2.3: Proposed Theoretical Framework

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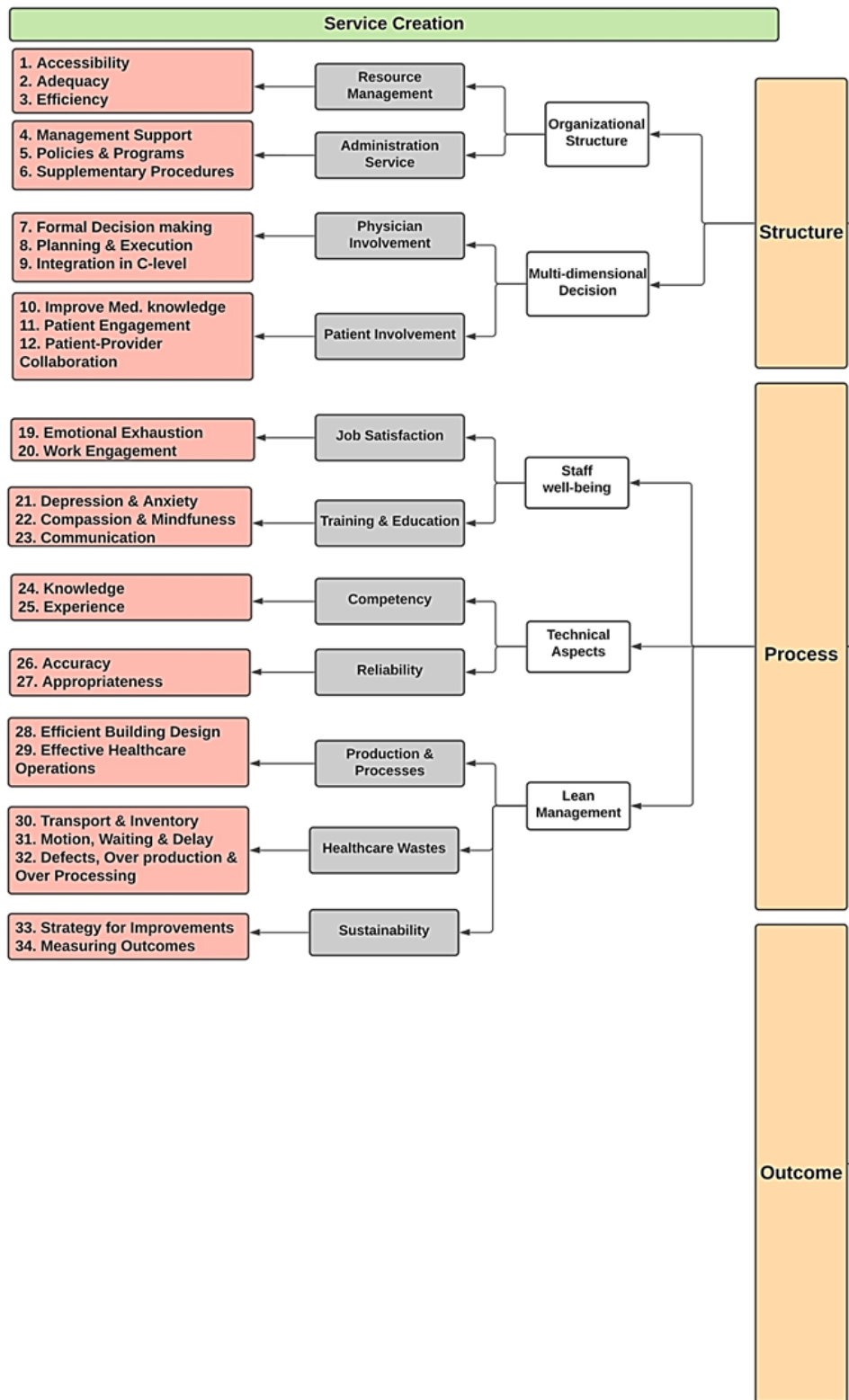
Figure 2.4: Detail view of service creation side
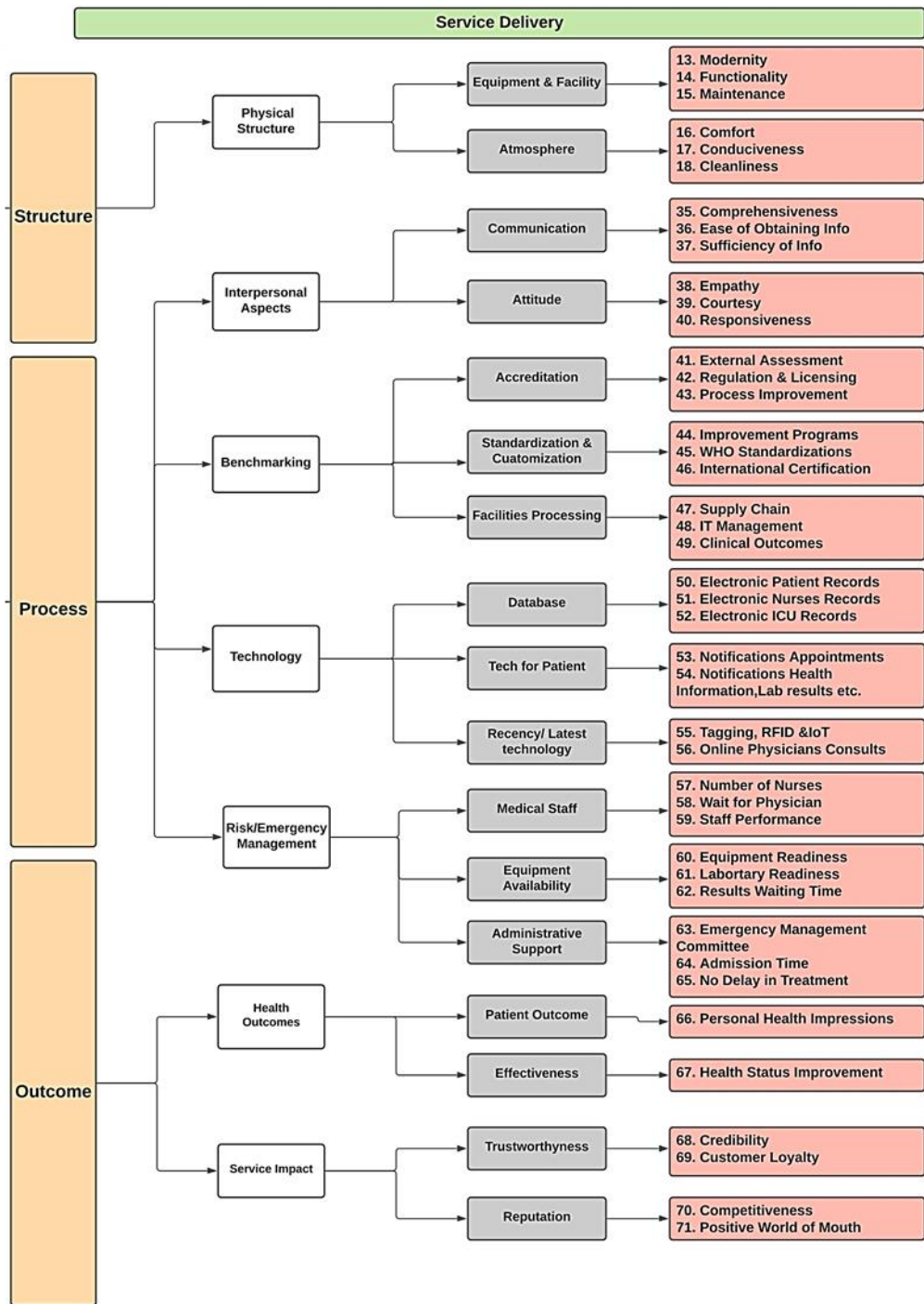
Figure 2.5: Detail view of service delivery side

Chapter 3. Proposed Solution and Research Methodology

The proposed solution is to integrate the patient's perspective into the quality improvement tools and practices. Patients are the end-users of the healthcare service, considering their voice in managerial decisions and quality strategic planning holds great importance. As represented in previous section 2.3, a framework will be designed that amalgamate patient's perspective with the clinical staff and non-clinical staff perspective to improve the quality of healthcare. An optimized quality improvement practice through a versatile approach to enhance quality from all the perspective at once, by narrowing down the most important factors.

3.1.   Research Methodology

Our research aim is to develop a framework that incorporates various healthcare stakeholder's perspectives into one instrument to improve the quality of healthcare services. Our research approach to dig deeper is based on "Research Onion" model presented by Saunders et al. in 2007[67]. Our research philosophy is pragmatism as it is a well blend of interpretive and positivism, and inductive research approach is used to determine the results. The study utilized detailed literature review of dimensions important for healthcare service quality. Further a questionnaire is developed based to this respective framework and used for the data collection for this study. The framework exhibits 71 quality factors that directly affects the quality of healthcare system from all the three stakeholder's perspective. Then, CFA analysis is performed on collected data. All dimensions with high score are structured as an important dimension for healthcare quality services. The focus of the study is on all medium to large size healthcare facilities, the sample size of the study is given here:

Study Sample: Quantitative method is used to collect the data and individual perception through online questionnaire, our data collect tool used for this study is Google forms. A sample of139 respondents was obtained representing UAE Hospitals including:

Management Perspective: This group of population represents hospital staff with no or very basic medical knowledge. They are mainly the people work at healthcare operations departments e.g., administration, quality, finance, and other

clerical departments etc. Due to Covid-19 we could be able to reach more hospital due to entry restriction into the hospitals.

Clinical Staff Perspective: This group of population represents hospital staff with adequate and high-end knowledge. They are mainly the people providing healthcare services e.g., front-line staff, doctors, nurses, lab assistance, physiotherapist, pharmacist, and other medical consultants. Due to Covid-19 we could be able to reach more hospital due to entry restriction into the hospitals.

Patients Perspective: This group of population represents general public, likely to visit UAE healthcare facilities in the past 3 years, it includes inpatient (stayed infacility from 1-45 days or at least 1 night), outpatients (walk-in patients &no night stay at the facility)

In summary the Research Objectives to achieve in this study are:

1. Evaluate the existing quality improvement practices, process from different perspectives and how they are affecting the healthcare systems and contributing stakeholder's perspective
2. Identify the gaps between the different quality improvement practices from different perspectives and develop a questionnaire to address these gaps and validate it from health experts
3. Prioritize the gaps based on the level of importance from each stakeholder and integrate the results together of all the stakeholders
4. Design a framework that encompasses the important gaps and shortcomings that are found in the Research Question 2
5. Validate the framework by passing it to healthcare facilities and make amendments according to their suggestions
6. Comparison with other quality improvement process and recommend the tool to healthcare facilities

To achieve the research objectives a structured approach for the research methodology should was adapted. A high-level flow chart shown in Figure 3.1, it demonstrates the five main steps required to achieve the objective of the study.

3.1.1. Data collection. The first step of the process is investigating the literature and ask the health industry elites about the significant factors about the quality of healthcare and different models, frameworks and tools used to improve quality management. This step is partially done by literature and partially through interviews, meetings and discussion with the healthcare management, clinical staff, and patients to list all the important quality factors from different perspective.

3.1.2. Structure an initial framework. Combine and structure important factors into a framework. Once the framework is ready, build a questionnaire out of it and seek input from all stakeholders. Patients and healthcare staff (clinical and non-clinical) were requested to fill out the survey. A questionnaire is to be developed to collect the data from patients, hospital staff (clinical and non-clinical). All the questions in the questionnaire (see Appendix A) are based on the proposed framework shown in Figure 2.3 (chapter 2). The framework depends on different attributes of the healthcare service and further these are divided into multi dimensions of providing the service to the patient. For each observed variable there is one question in the questionnaire. Each question is written in polite tone and do not restrict respondent to respond to it mandatory. There are 71 directly observed variables, and each question in the questionnaire are based on 3rd dimensions. All the observed variable used in the questionnaire follows the definition of the WHO Healthcare Systems Strengthening Glossary [33].

3.1.3. Analysis. Confirmatory Factor Analysis (CFA) is performed on the data, collected through the questionnaires to identify the most important and crucial factors that results in quality improvement in the healthcare facility. Prioritize the most important factors and elimination of the irrelevant factors has been done. A second framework is developed after the CFA results, only the factors with high importance are included in the second framework.

Confirmatory Factor Analysis (CFA) stands for confirmatory analysis is a multivariable statistical Procedure that is used to determine the how well the measured variables represent the constructs. CFA technique is quite like the exploratory factor analysis (EFA), the only difference is data is explored and provide adequate information about the number of dimensions required to represent data. In

EFA variables have relationship with every latent variable but in CFA statistics can specify the number of factors required in the data and which factor has a relationship to which latent variable specifically. CFA is tool that can help confirm or reject the theoretical measurement of a research study [68].



```
┌─────────────────────────┐
│ Ask experts about significant │
│ quality factors and List them │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Develop a Framework &   │
│ Build Questionnaire     │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Analyze collected data  │
│ using SEM               │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Apply the framework     │
│ to a case study         │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Build Questionnaire to  │
│ validate the framework  │
└─────────────────────────┘
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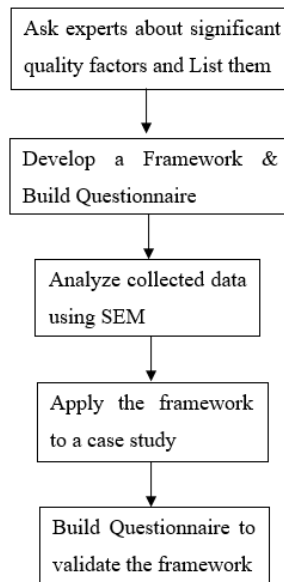
Figure 3.1: Research Methodology Flow chart

3.1.4. Reliability and validation of results. Once data was collected from relevant population then reliability and validity of data is checked using R Studio and Smart-PLS software.

3.1.5. Report the results. Once the framework is validated from the healthcare facility its results can be implemented to the relevant population (This step has not been performed due to the Covid-19 pandemic situation). The results of this study has identified the gaps between three healthcare quality perspectives and suggest top dimensions, that are important from all the three perspectives. Improving these top dimensions can elevate the standard of healthcare quality for all the mentioned stakeholders.

3.2. Timeline

The timeline of the research greatly impacted by the outbreak of the covid-19.

As more and more time spent on data collection, for the sake of if things get better, we can approach the healthcare facilities. The timeline for the thesis completion is as shown in Figure 3.2.

Thesis Gantt Chart

Tasks	Week 4	Week 10	Week 18	Week 21	Week 25	Week 36	Week 42	Week 52
Review literature & Identify the gaps	■							
Investigate important quality dimensions from literature review		■						
Develop a Framework from the literature review		■						
Validate the Framework				■				
Build Questionnaire from the Framework					■			
Spread the questionnaire across and collect respoinses						■		
Analysis on the Collected Data							■	
Summarize the findings and validations								■

Figure 3.2: Gantt Chart of Thesis Work

3.3. Limitation of Research Work

This study does not consider any financial aspect involved in the healthcare service quality. Due to Covid-19, we could not contact healthcare professional, and healthcare staff to help us in data collection from the facility and validate the suggested framework (second framework). The sample size taken for this study is also very small due to the Covid-19 circumstances.

3.4. Key Takeaways

Quality of healthcare is a vague term to be defined through a concrete definition, there are number of initiatives and efforts are in practice to raise the level of quality of care and service effectiveness to deliver high end sophisticated service to the patients. This study intents to incorporate patient's voice within the quality improvement practices and aims to raise the standard of healthcare quality up to the patient's, healthcare elites and healthcare management expectation by using their inputs in the research work.

Chapter 4.   Results and Discussions

Initially CFA has been performed on the initial framework which has been proposed by the literature review (referred as Model A). The constructs of the proposed framework have been labeled as shown in Figure 4.1 and detail view of the service creation and service delivery labeling is shown in Figure 4.2 and Figure 4.3.
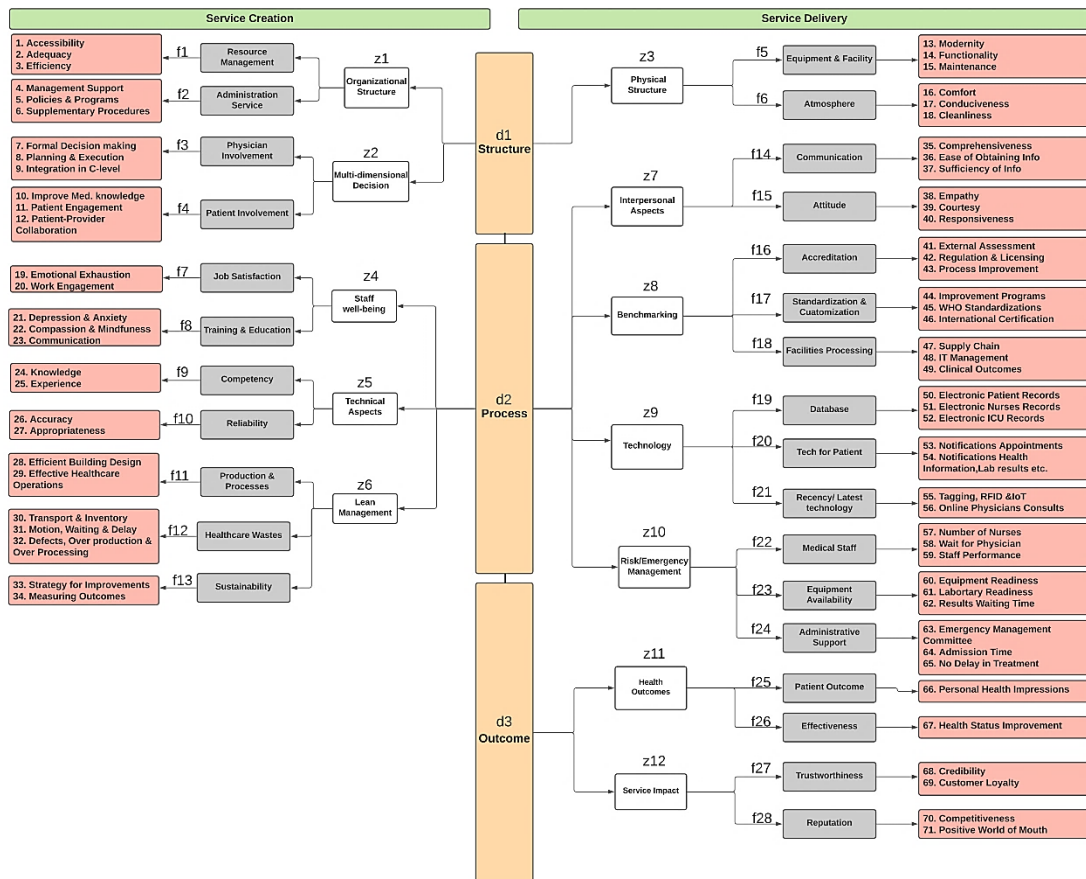

Figure 4.1: Labeled Theoretical Framework

While all the constructs in the 3^{rd} dimension are named as (q1, q2, q3… q71) and considered as observed variables. R studio has been used as the simulation software.

4.1.   Algorithm and Assumption of the R code

The dependence of the constructs between each other are stated below. These are the hypothetical assumptions considered as a starting point to perform CFA on the dataset.
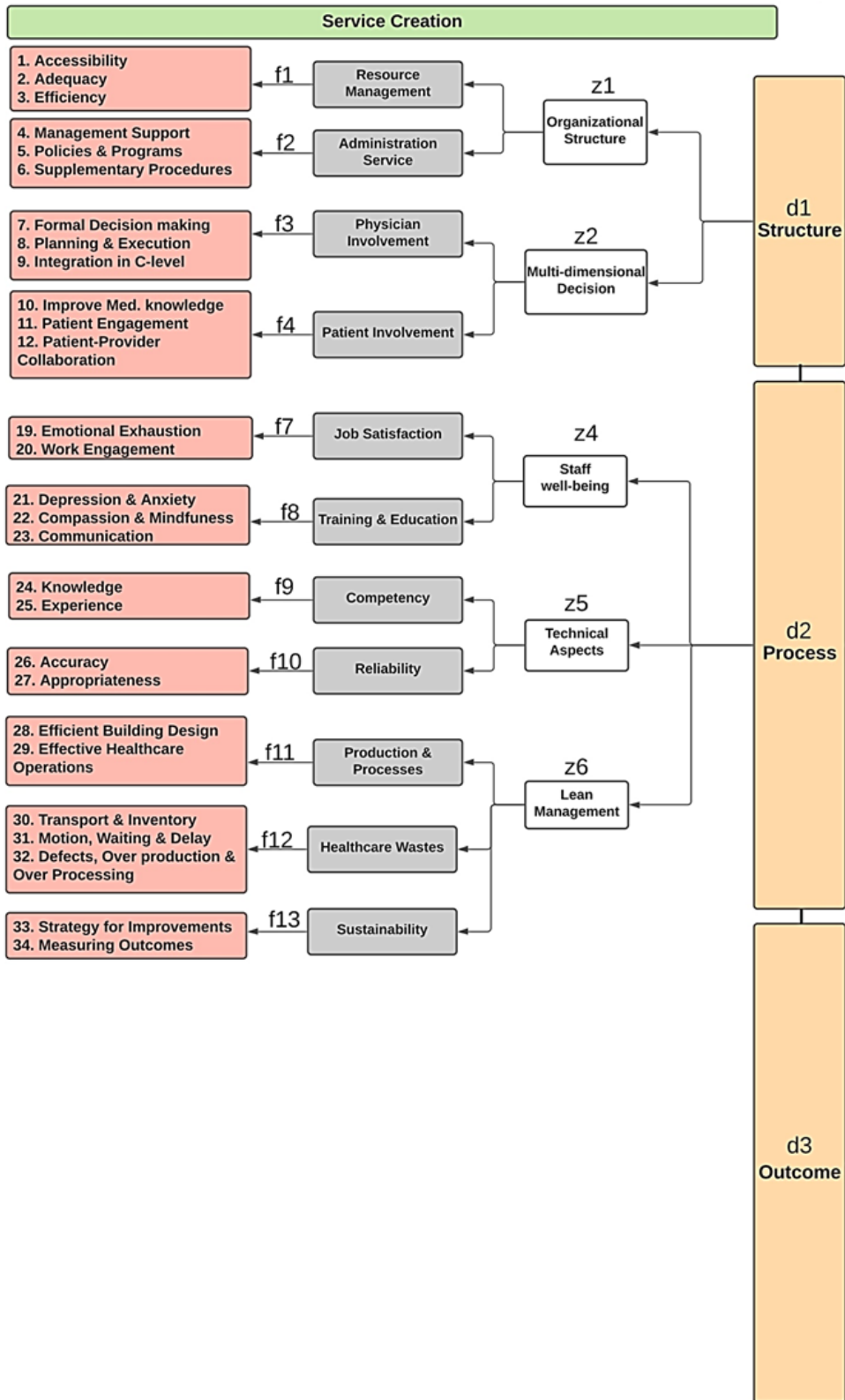
Figure 4.2: Labeling of Service Creation side
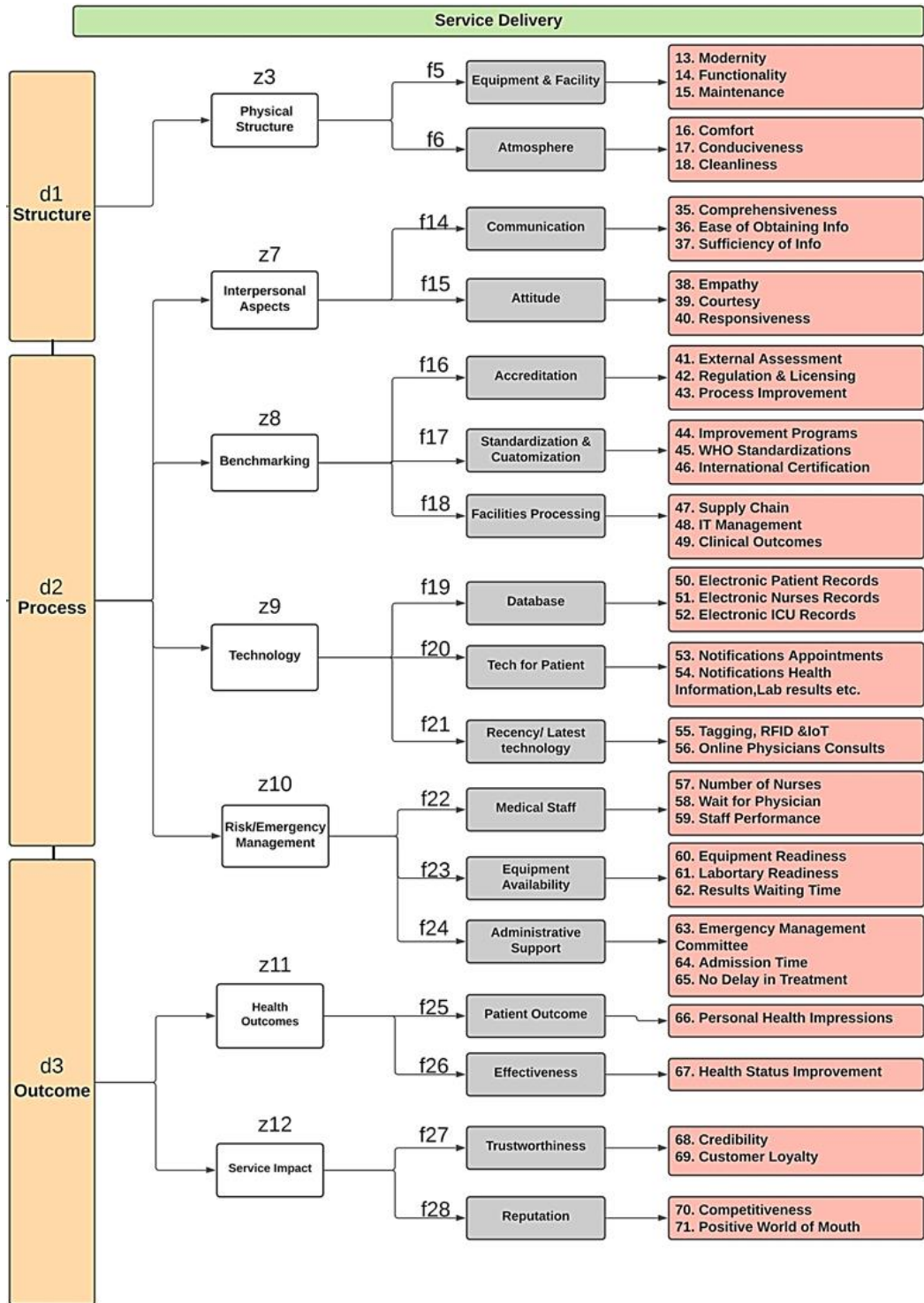
Figure 4.3: Labeling of Service Delivery side

The algorithm of CFA for constructs in 3rd Dimension (q1, q2, q3… q71) and 2nd Dimension (f1, f2, f3…f28)

- f1 has a significant relationship with q1, q2, q3 and f2, while no significant relationship with any of the constructs of the framework
- f2 has a significant relationship with q4, q5, q6 and f1, while no significant relationship with any of the constructs of the framework
- f3 has a significant relationship with q7, q8, q9 and f4, while no significant relationship with any of the constructs of the framework
- f4 has a significant relationship with q10, q11, q12 and f3, while no significant relationship with any of the constructs of the framework
- f5 has a significant relationship with q13, q14, q15 and f6, while no significant relationship with any of the constructs of the framework
- f6 has a significant relationship with q16, q17, q18 and f5, while no significant relationship with any of the constructs of the framework
- f7 has a significant relationship with q19, q20, and f8, while no significant relationship with any of the constructs of the framework
- f9 has a significant relationship with q24, q25, and f10, while no significant relationship with any of the constructs of the framework
- f10 has a significant relationship with q26, q27, and f9, while no significant relationship with any of the constructs of the framework
- f11 has a significant relationship with q28, q29, f12 and f13, while no significant relationship with any of the constructs of the framework
- f12 has a significant relationship with q30, q31, q32, f11 and f13, while no significant relationship with any of the constructs of the framework
- f13 has a significant relationship with q33, q34, f11 and f12, while no significant relationship with any of the constructs of the framework
- f14 has a significant relationship with q35, q36, q37 and f15, while no significant relationship with any of the constructs of the framework
- f15 has a significant relationship with q38, q39, q40 and f14, while no significant relationship with any of the constructs of the framework
- f16 has a significant relationship with q41, q42, q43 f17 and f18, while no

significant relationship with any of the constructs of the framework

- f17 has a significant relationship with q44, q45, q46, f16 and f18, while no significant relationship with any of the constructs of the framework
- f18 has a significant relationship with q47, q48, q49, f16 and f17, while no significant relationship with any of the constructs of the framework
- f19 has a significant relationship with q50, q51, q52, f20 and f21, while no significant relationship with any of the constructs of the framework
- f20 has a significant relationship with q53, q54, f19 and f21, while no significant relationship with any of the constructs of the framework
- f21 has a significant relationship with q55, q56, f19 and f20, while no significant relationship with any of the constructs of the framework
- f22 has a significant relationship with q57, q58, q59, f23 and f24, while no significant relationship with any of the constructs of the framework
- f23 has a significant relationship with q60, q61, q62, f22 and f24, while no significant relationship with any of the constructs of the framework
- f24 has a significant relationship with q63, q64, q65, f22 and f23, while no significant relationship with any of the constructs of the framework
- f25 has a significant relationship with q66, and f26, while no significant relationship with any of the constructs of the framework
- f26 has a significant relationship with q67, and f25, while no significant relationship with any of the constructs of the framework
- f27 has a significant relationship with q68, q69, and f28, while no significant relationship with any of the constructs of the framework
- f28 has a significant relationship with q70, q71, and f27, while no significant relationship with any of the constructs of the framework

The algorithm of CFA for constructs in 2nd Dimension (f1, f2, f3…f28) and 1st Dimension (z1, z2, z3… z12)

- z1 has a significant relationship with f1, f2, and z2, while no significant relationship with any of the constructs of the framework
- z2 has a significant relationship with f3, f4, and z1, while no significant

relationship with any of the constructs of the framework

- z3 has a significant relationship with f5, and f6, while no significant relationship with any of the constructs of the framework

- z4 has a significant relationship with f7, f8, z5, and z6, while no significant relationship with any of the constructs of the framework

- z5 has a significant relationship with f9, f10, z4, and z6, while no significant relationship with any of the constructs of the framework

- z6 has a significant relationship with f11, f12, f13, z4and z5, while no significant relationship with any of the constructs of the framework

- z7 has a significant relationship with f14, f15, z8, z9, and z10, while no significant relationship with any of the constructs of the framework

- z8 has a significant relationship with f16, f17, f18, z7, z9, and z10, while no significant relationship with any of the constructs of the framework

- z9 has a significant relationship with f19, f20, f21, z7, z8, and z10, while no significant relationship with any of the constructs of the framework

- z10 has a significant relationship with f22, f23, f24, z7, z8, and z9, while no significant relationship with any of the constructs of the framework

- z11 has a significant relationship with f25, f26, and z12, while no significant relationship with any of the constructs of the framework

- z12 has a significant relationship with f27, f28, and z11, while no significant relationship with any of the constructs of the framework

The algorithm of CFA for constructs in 1st Dimension (z1, z2, z3…z12) and 2nd Dimension (d1, d2, d3)

- d1 has a significant relationship with z1, z2, and z3, while no significant relationship with any of the constructs of the framework

- d2 has a significant relationship with z4, z5, z6, z7, z8, z9, z10, while no significant relationship with any of the constructs of the framework

- d3 has a significant relationship with z11 and z12, while no significant relationship with any of the constructs of the framework

  R code is written keeping in view the above assumptions and algorithm.

Please see the Appendix B for the R code. The model fit of the framework was very low approximately 0.6, the loading factor of many factors are quite low, less than 0.45 and the reliability test represents interdependences between many constructs. The low model fit and loading factors are due to the small sample size (referred to the covid-19 circumstances). This framework can be a better fitted model for a bigger dataset and same as the CFA technique. The current framework should be restructured by considering the following criteria for a valid framework to cater the challenge of small sample size:

- Ignore the constructs with factor loading less than 0.45.
- Merge the construct together which have lower Cronbach alpha. Cronbach alpha should be equal to greater than 0.70 for each construct.
- CFI and TLI should be 0.90 or higher.
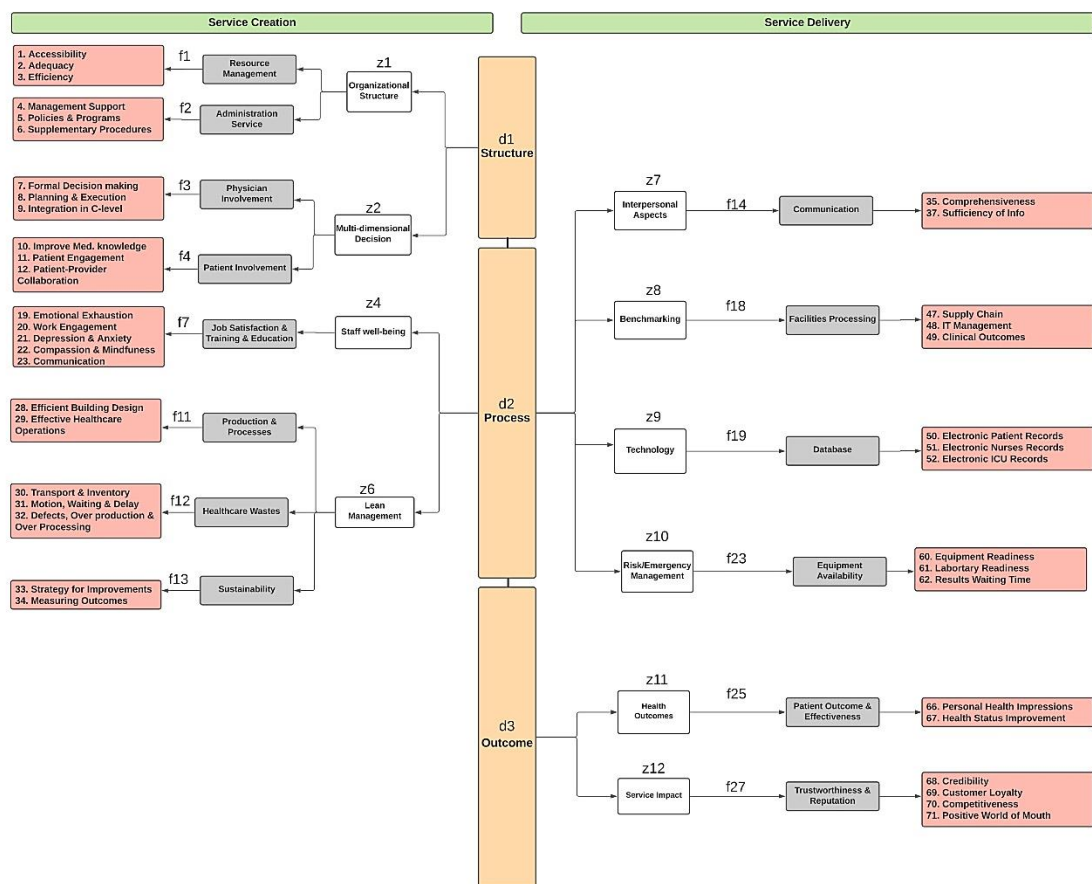
Figure 4.4: Updated Framework

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The framework has been updated according to the above criteria. The updated framework (referred as Model B) is shown in Figure 4.4, detailed view of constructs on service creation is shown in Figure 4.5 & Figure 4.6.
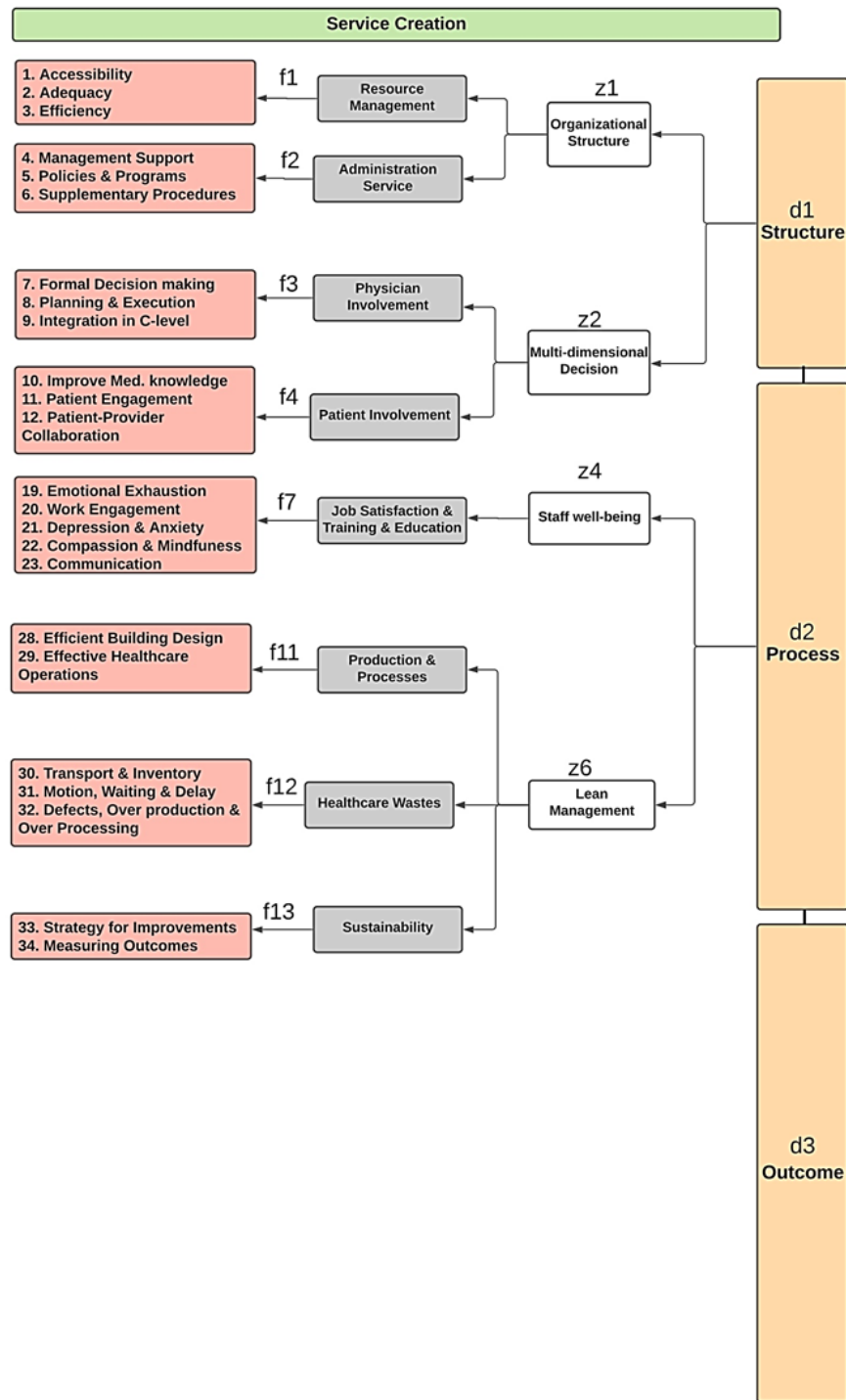
Figure 4.5: Updated framework Service Creation side
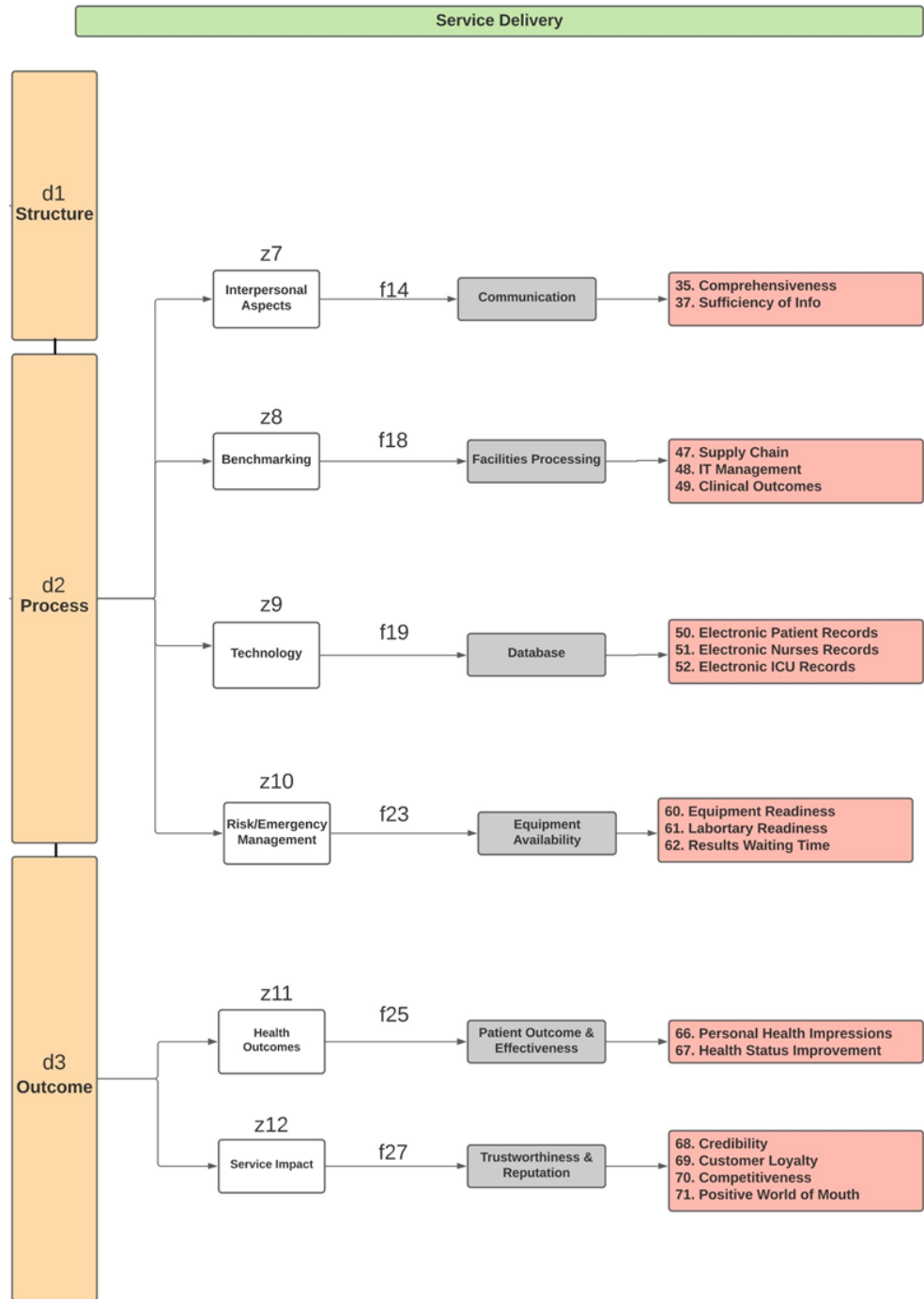
Figure 4.6: Updated Framework Service Delivery Side

An important aspect that needs to be taken into consideration that for constructs z4, z11 and z12 the 2^{nd} dimensions (f7, f8), (f25, f26), (f27, f28) are merged due to low Cronbach alpha values, it can be interpreted as Staff Well-being is Job Satisfaction and Training & Development. Keeping the 2^{nd} dimension is for the

purpose of maintaining the coherency with the remaining framework as the entire framework exhibits a three-dimensional structure. The constructs $z7$, $z8$, $z9$, $z9$, $z10$ shows that they are $f14$, $f15$, $f19$ and $f20$ keeping two dimensions (z & f) is for the purpose of coherency. As the Interpersonal Aspects is Communication that is further observed by two variables. The three-dimensional network presented for these constructs are for the purpose of coherency with the remaining framework.

The results generated by running CFA analysis on the updated framework is discussed here, important factors for Service Creation and Service Delivery are discussed separately:

Average Mean and Standard Deviation for Service Creation

The topmost constructs are discussed here with the statistical importance in the updated framework. Table 4.1 describes the average mean and standard deviation of the top constructs of the service creation side. It is found that the Administrative Services in service creation process is ranked at top in the list as scored by patients, clinical staff and health professionals, mean value is 4.32 and Standard deviation value is 0.60. Resource Management in service creation process is ranked at number 2 (much closer to administrative services), mean value is 4.31 and Std. deviation value is 0.68. Job satisfaction in service creation process is ranked at number 3, its mean value is 4.23 and Std. deviation value is 0.54. Healthcare waste in service creation process is ranked at number 4, its mean value is 4.16 and Std. deviation value is 0.69.

Physician involvement in service creation process is ranked at number 5, its mean value is 4.10 and Standard deviation value is 0.69. Sustainability in service creation process is ranked at number 6, its mean value is 4.04 and Std. deviation value is 0.72. While patient involvement ranked at bottom along with production and process with mean values 3.98 & 3.92 and Std. deviation values 0.71 and 0.81 respectively. Overall mean score for all constructs is 4.13.

Average Mean and Standard Deviation for Service Delivery

It is found in the results that Equipment Availability in service delivery process is ranked at top in the list as scored by patients, clinical staff and health professionals, mean value is 4.33 and Std. deviation value is 0.62. Database in service delivery process is ranked at number 2, mean value is 4.29 and Std. deviation value is 0.64. Trustworthiness in service delivery process is ranked at number 3, its mean

value is 4.27 and Std. deviation value is 0.67 as shown in Table 4.2.

Table 4.1: Mean and Standard Deviation of Service Creation

Service Creation	Average	Std.
Administrative Services	4.32	0.60
Resource Management	4.31	0.68
Job Satisfaction	4.23	0.54
Healthcare Waste	4.16	0.69
Physician Involvement	4.10	0.69
Sustainability	4.04	0.72
Patients Involvement	3.98	0.71
Production and Process	3.92	0.81
Overall Score	**4.13**	

Table 4.2: Mean and Standard Deviation for Service Delivery

Service Delivery	Average	Std.
Equipment Availability	4.33	0.62
Database	4.29	0.64
Trustworthiness	4.27	0.67
Patient Outcome	4.23	0.66
Communication	4.19	0.63
Facilities Processing	4.06	0.67
Overall Score	**4.23**	

Patient Outcome in service delivery process is ranked at number 4, its mean value is 4.23 and Std. deviation value is 0.66. Communication in service delivery process is ranked at number 5, its mean value is 4.19 and Std. deviation value is 0.63. Lastly, Facilities Processing in service delivery process is ranked at bottom, its mean value is 4.06 and Std. deviation value is 0.67.

Reliability Test for Service Creation

Table 4.3 represents the reliability score of the top constructs, Administrative Services in service creation process has Cronbach alpha 0.73 > 0.70 showing internal consistency for 3 items including management support, policies & programs, and supplementary procedures. Resource Management in service creation process has

Cronbach alpha 0.75 > 0.70 showing internal consistency for 3 items including accessibility, adequacy, and efficiency. Staff well-being in service creation process has Cronbach alpha 0.83 > 0.70 showing internal consistency for 5 items including emotional exhaustion, work engagement, depression and anxiety, compassion & mindfulness, communication.

Table 4.3: Reliability Analysis Service Creation

Service Creation	Alpha	Items
Administrative Service	0.73	3
Resource Management	0.75	3
Staff well-being	0.83	5
Healthcare Waste	0.82	3
Physician Involvement	0.86	3
Sustainability	0.84	2
Patients Involvement	0.79	3
Production and Process	0.85	2

Healthcare waste in service creation process has Cronbach alpha 0.82> 0.70 showing internal consistency for 3 items including transport & inventory, motion, waiting & delay, defects and over production & over processing. Physician Involvement in service creation process has Cronbach alpha 0.86> 0.70 showing internal consistency for 3 items including formal decision making, planning and execution, Integration in C- level. Sustainability in service creation process has Cronbach alpha 0.84> 0.70 showing internal consistency for 2 items including strategy for improvements and measuring outcomes. Patients Involvement in service creation process has Cronbach alpha 0.79> 0.70 showing internal consistency for 3 items including Improve Med knowledge, Patients Engagement and Patient Provider Collaborative. Production and Process in service creation process has Cronbach alpha 0.85 > 0.70 showing internal consistency for 2 items including Efficient Building Design and Effective Healthcare Operations. Reliability Test for service delivery and service creation is also explained in the next table, which describes the interrelationship of all the constructs.

Reliability Test for Service Delivery

In Table 4.4, it is found that Equipment Availability in service delivery

process has Cronbach alpha 0.87 > 0.70 showing internal consistency for 3 items including Equipment readiness, Laboratory readiness and Results waiting time. It is found that Database in service delivery process has Cronbach alpha 0.88 > 0.70 showing internal consistency for 3 items including Electronic Patient Records, Electronic Nurses Records and Electronic ICU Records. It is found that Trustworthiness in service delivery process has Cronbach alpha 0.89 > 0.70 showing internal consistency for 4 items including Credibility, Customer loyalty, Competitiveness and Positive world of mouth.

Table 4.4: Reliability Analysis Service Delivery

Service Delivery	Alpha	Items
Equipment Availability	0.87	3
Database	0.88	3
Trustworthiness	0.89	4
Patient Outcome	0.74	2
Communication	0.78	3
Facilities Processing	0.82	3

Patient outcome in service delivery process has Cronbach alpha 0.74> 0.70 showing internal consistency for 2 items including Personal health impressions and Health status improvement. Communication in service delivery process has Cronbach alpha 0.78> 0.70 showing internal consistency for 3 items including Comprehensiveness and Ease of obtaining info. Facilities Processing in service delivery process has Cronbach alpha 0.82> 0.70 showing internal consistency for 3 items including Supply chain, IT management and Clinical outcomes.

Model Fit and Comparison of Initial and Updated Framework

Table 4.5 represents model fit result's summary, it is observed that Chi-square value of Model A which was initially proposed in the theoretical framework is quite high 1106.53 (p<0.01), yet the updated model B which is proposed after results by eliminating loading scores less than 0.45 or loading values (p> 0.05) has Chi-square value 5.76 (p<0.01). RMSEA value is 0.078 < 0.08 in model B. While CFI is also higher than 0.90 in model B. TLI on the other hand is also fit in Model B (0.930 > 0.90). SRMR is lower than 0.09 in both Models A and B. All these statistics are

showing fitness of model B.

Table 4.5: Model Fit Summary

Fit Index	Acceptable Threshold Levels	Outcomes of Model A	Outcomes of Model B
(Chi-square)	P value (p > 0.05)	1106.53(p <0.01)	5.76(p <0.01)
(RMSEA)	RMSEA of 0.08 or lower	0.090	0.078
(CFI)	CFI of .90 or higher	0.688	0.910
(TLI)	TLI of .90 or higher	0.671	0.930
SRMR	SRMR of 0.09 or lower	0.068	0.068

In Table 4.6, factor loading scores for constructs under service creation process are shown, where it is observed that Resource Management for all three items including Accessibility, Adequacy and Efficiency has estimates greater than 0.45 and z values significant with (sig. < 0.05). Administrative Service for all three items including Management Support, Policies and Programs and Supplementary Procedures has estimates greater than 0.50 and z values significant with (sig. < 0.05). Physician Involvement for all three items including Formal Decision Making, Planning and Execution and Integration in C-Level has estimates greater than 0.45 and z values significant with (sig. < 0.05).

Patients Involvement for all three items including Improve Med knowledge, Patients Engagement and Patient Provider Collaborative has estimates greater than 0.50 and z values significant with (sig. < 0.05). Staff well-being for all five items including Emotional Exhaustion, Work Engagement, Depression & Anxiety, Compassion & Mindfulness and Communication has estimates greater than 0.70 and z values significant with (sig. < 0.05). Production and Process for both items including Efficient Building Design and Effective Healthcare Operations has estimates greater than 0.45 and z values significant with (sig. < 0.05). Healthcare Waste for all three items including Transport & Inventory, Motion Waiting & Delay and Defects Over Production &Over Processing has estimates greater than 0.50 and z values significant with (sig. < 0.05). Sustainability for both items including Strategy for Improvements and Measuring Outcomes has estimates greater than 0.50 and z values significant with

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(sig. < 0.05). Factor loading and estimates of each side service creation and service delivery is shown in the next Table. In the above Table 4.7, factors loading scores for constructs under service delivery process are shown, where it is observed that Communication for both items including Comprehensiveness and Ease of Obtaining Info has estimates greater than 0.45 and z values significant with (sig. < 0.05). Facilities Processing for all three items including Supply Chain, IT Management and Clinical Outcomes has estimates greater than 0.60 and z values significant with (sig. < 0.05). Database for all three items including Electronic Patient Records, Electronic Nurses Records and Electronic ICU Records has estimates greater than 0.80 and z values significant with (sig. < 0.05). Equipment Availability for all three items including Equipment Readiness, Laboratory Readiness and Results Waiting Time has estimates greater than 0.70 and z values significant with (sig. < 0.05). Patient Outcome for its both factors including Personal Health Impressions and Health Status Improvement has estimates greater than 0.50 and z values significant with (sig. < 0.05). On the other hand, Trustworthiness for all four items including Credibility, Customer Loyalty, Competitiveness and Positive World of Mouth has estimates greater than 0.90 and z values significant with (sig. < 0.05).

4.2.   Discussion

The study is conducted for healthcare facilities of UAE to examine the quality management in the hospitals/medical centers by taking the sample from population involving the patients and healthcare staff (clinical and non-clinical). Some of the factors are presented in the framework (Model A) was considered as the important factors for the quality management in the hospitals of UAE. But after the analysis of data collected from respondent including patients and healthcare staff (clinical and non-clinical), it is found that some of the factors which was consider as important for the study need to be eliminated from the framework. Now, according to the analysis of result, research indicates that the factors which are important in perspectives of patients and healthcare staff (clinical and non-clinical) are organizational structure, multidimensional decisions, staff wellbeing, lean management, interpersonal aspects, benchmarking, technology, emergency management, health outcomes, and service impact.

Table 4.6: Factor Loadings Service Creation

Service Creation			
Variables	Estimate	z-value	P(>|z|)
Resource Management			
Accessibility	0.472	6.404	0.000
Adequacy	0.463	7.148	0.000
Efficiency	0.548	7.039	0.000
Administrative Service			
Management Support	0.543	6.539	0.000
Policies and Programs	0.513	1.386	0.000
Supplementary Procedures	0.544	6.232	0.000
Physician Involvement			
Formal Decision Making	0.580	11.097	0.000
Planning and Execution	0.540	9.53	0.000
Integration in C-Level	0.453	11.574	0.000
Patients Involvement			
Improve Med knowledge	0.538	9.073	0.000
Patients Engagement	0.526	9.623	0.000
Patient Provider Collaborative	0.543	8.902	0.000
Staff well-being			
Emotional Exhaustion	0.835	12.657	0.000
Work Engagement	0.749	9.002	0.000
Depression & Anxiety	0.853	15.162	0.000
Compassion & Mindfulness	0.840	13.523	0.000
Communication	0.786	12.596	0.000
Production and Process			
Efficient Building Design	0.460	8.002	0.000
Effective Healthcare Operations	0.535	7.827	0.000
Healthcare Waste			
Transport & Inventory	0.545	6.869	0.000
Motion Waiting & Delay	0.551	6.775	0.000
Defects Over Production & Over Processing	0.564	6.816	0.000
Sustainability			
Strategy for Improvements	0.550	7.104	0.000
Measuring Outcomes	0.539	7.111	0.000

Table 4.7: Factor Loadings Service Delivery

Service Delivery			
Variables	Estimate	z-value	P(>|z|)
Communication			
Comprehensiveness	0.542	8.674	0.000
Ease of Obtaining Info	0.496	8.151	0.000
Facilities Processing			
Supply Chain	0.838	17.585	0.000
IT Management	0.836	16.639	0.000
Clinical Outcomes	0.676	11.709	0.000
Database			
Electronic Patient Records	0.872	17.576	0.000
Electronic Nurses Records	0.819	11.777	0.000
Electronic ICU Records	0.904	18.364	0.000
Equipment Availability			
Equipment Readiness	0.807	18.767	0.000
Laboratory Readiness	0.718	15.762	0.000
Results Waiting Time	0.910	22.692	0.000
Patient Outcome			
Personal Health Impressions	0.613	14.222	0.000
Health Status Improvement	0.597	13.64	0.000
Trustworthiness			
Credibility	0.920	17.151	0.000
Customer Loyalty	0.971	17.765	0.000
Competitiveness	0.993	16.306	0.000
Positive World of Mouth	0.987	21.291	0.000

The analysis of the responses by the respondents indicates that the organizational structure is very significant for the purpose of quality management in the hospitals of UAE. Organizational structures of UAE hospitals demonstrate the level of management, and these adequate allocations of resources allows the effective management of operations. Findings indicate that without having appropriate organizational structure, healthcare system would face many challenges regarding the management of patients, and clinical staff. Administration service is the most reliable factor that helps to build the strong organizational structure as they plan the activities of the departments, evaluate the clinical and non-clinical staff, assure the quality and

many others. The importance of organizational structure is also supported from the study by Benzer, et al (2017) as they evaluate the role of this factor in readiness for change [66].

The other important factors found in multidimensional decision (Physician Involvement and Patient Involvement) which help to maintain the quality of healthcare facility and increases the trust of patients on their doctors. According to the responses, patient's involvement in the healthcare management decision helps them to know about their perspective more accurately and the ways of providing service of care which increase their satisfaction level. Also, the study conducted by Morley & Cashell in 2017 shows that the involvement of staff and the patients in the decision-making process is very significant in offering exceptional care to the patients[69]. Staff wellbeing is the factor which is essential for the productive staff as it includes the factors which helps to increase employee's job satisfaction.

According to the respondents, the most important way to increase the job satisfaction is training and development of staff. Through appropriate trainings, the skills and competencies of staff contribute in reducing their depression and anxiety and helps them to be more productive at the workplace. This is the duty of human resource management of the hospitals in UAE to improve the performance of employees and this is evaluated in the study by Almaskari & Marni, in 2020. Accruing to the study, through participative and collaborative styles, management can increase the job satisfaction of their employees[70].

Lean management can enhance the quality of the patient care by saving both time and resources. This also helps to lessen the stay of the patients which ultimately results in more free beds for accommodation of more patients. Lean management is important because it reduces the errors, and accidents which increases the care for the patients. Also, according to some of the respondents, lean techniques provide structured approaches to resolve the resource related problems that is considered as the cause of the waste in hospitals so in short it helps in managing the waste effectively, patients can get better care and sustainability of the system increases. This was also shown by the Aljaberi, Hussain, & Drake., in 2017 that lean management enables sustainability in the health care sector [71].

Communication as the interpersonal aspect is found to be very effective after analyzing the results. This is because of the reason that effective communication between patients, clinical staff and health professionals helps to spread the important information effectively in the hospitals which ultimately improves the quality management. Results also indicates that the effective communication as interpersonal skills are important to protect the patients, for saving expenses and intensifies daily efficiency. Also, patients can get the comprehensive details about their medical history which lessen the probabilities of errors and mistakes. Benchmarking is the mandatory factor in the hospitals of UAE as it is used to improve the performance of the healthcare system. This can be done through appropriate maintenance of machines and by using software of facility management to monitor the working of the equipment's, facilities, and resources.

Health care supply chain is also an effective contributor towards healthcare quality which was shown by the findings of the study by Hussain, et al. that there are various factors that which causes the effectiveness of supply chain in the health care sector[72]. Management of IT department is also important to effectively assist the clinical and non-clinical staff for the purpose of managing the patients. In the contemporary world, advancements in the technology are very important to maintain the patients, and nurses record electronically, also the records of the ICUs are managed with a deliberate care through technology.

Availability of equipment's is also considered as the main factor to reduce the risks and emergencies in the hospitals. As some of the respondents indicates that the non-availability of equipment leads to the increase the waiting time, and less care to the patients. Hence, laboratory readiness, equipment readiness would be improved through managing the availability of the equipment. Health outcomes are considered as the most important factor in the patient's perspective. Clinical staff must adapt an efficient and effective ways to provide quality treatment to the patients to improve their health condition. Improvement in the health status of the patients leads to the good reputation of hospitals in the country. According to respondents, the services provided in the hospitals of UAE have a great impact on the patients as it increases the patient loyalty and satisfaction of patients by taking the treatment from the specialized doctors. Hospitals which provide betters care gains competitive advantage

in the health care sector because it helps to gain the trust of the patients. The study conducted by the Mahboub, et al., in 2019 showed that the people prefer to get treatment from the private hospitals as their services are better than the government hospitals. According to the findings, there is a poor customer care in the government hospitals which decreases their trust on them [73].

Chapter 5.   Conclusion

Quality management in the healthcare system refers to the wide range of factors that affect the quality of the services provided to the patients. Quality improvement is significant because of the numerous reasons like it helps to enhance the accountability of clinical and non-clinical staff which includes the management staff, improves the resource efficiency, and identification and minimization of the medical mistakes. According to results some factors are considered as the most important factors which should be focused by the hospitals while managing the quality of the healthcare system. From the result section, it can be concluded that the administrative services are on the top according to the resulting mean score. Administration services are very important to regulate the operations of the health care systems effectively by dividing various tasks into departments and by developing and implementing policies for the betterment of the patients and employees.

It is evidenced that factors like administrative services, resource management, justification are on the top, indicating that these are the most important factors present in the UAE hospitals for quality management. But some other factors have lower values shows that the hospitals must improve in these areas to increases effectiveness. These areas include the involvement of physicians in decision making, sustainability, patients' involvement, production, and process. Also, results shows that the availability of equipment is the most important factor as all the operations of the hospitals depend on the equipment. Availability of equipment is very important as it helps to improve patient care in UAE. Hospitals of UAE have assured that the well-functioning equipment should be available to increase the patient satisfaction. Then records of the database through using technological advancement are on the second number following its effectiveness in the hospitals of UAE. Using appropriate technology to manage the record of the patients, nurses, and the ICUs helps to increase the efficiency of processes of the facility in the country. Trustworthiness developed in the patients and the employee through appropriate measures is also ranked high according to the results. According to the findings, the trust of the patients increases with the improved impact of services in the health care systems. Some factors are still there which needs to be improved in the hospitals of the UAE,

includes communication as an interpersonal skill, facilities processing, and patient health outcomes. Communication between patients and the clinical staff is very important to increase their health outcomes. If the doctors and nurses appropriately exchange the information with the patients, then it helps to increase their knowledge about their diseases. Effective communication helps to increase the effectiveness of health outcomes. Facilities processing is the factor that needs improvements because these facilities played a greater role in the mitigation of risks.

5.1. Recommendations

This research study recommended few suggestions for the quality of healthcare facilities in the UAE based on the analysis results. The managerial implication and future direction for further investigation of the study outcomes.

5.1.1. Managerial implications. The management of the hospitals of UAE must focus on improvement in various areas which need to be improved according to the results of the study. Management should improve the management of the healthcare facility, increase the efficiency of daily tasks and service facilities provided to the patients. Management should identify the vulnerable areas by allocating the most qualified employees which increases the productivity of the hospitals and hence increases sustainability. Advancements in technology must be adopted by the health care system to improve the production processes and reduces the errors caused by humans. Management must provide the appropriate machinery and technology to the physicians to treat people in a more advanced way to increase the sustainability of the hospitals in UAE. For the improvement in the factors of the service delivery, management needs to develop the most appropriate strategy for effective communication in the hospitals. They can customize the communication channels according to the requirements of the health care systems. Medical facilities can be improved through an increase in the resource allocations to the departments to increase provisions of facilities to the patients. Patients' health outcomes can be improved through developing strategies to promote well-informed diagnosis so that patients can know about everything about their diseases as sometimes human error causes distress among patients. Management must build a pleasant working environment for the clinical staff which increases their motivation and hence patient's

health outcomes improved. Management also encourages staff to encourage and support the patients even after their discharge from the facility.

5.1.2. Future directions. There are some factors which were not found as significant factors in the quality management of the health care systems. So, researchers must collect more samples and research to evaluate the significance of these factors as well. As the large sample size helps to gain a deeper understanding of the management of the hospitals and provides more and clear information as well. In this research, the sample size taken is very small due to the worst circumstances caused by the Covid 19 and because of the adaption of its precautionary measures. So, in the hard times of pandemic, the sample size of 139 respondents was only collected. But when the condition becomes normal then further researchers can increase their sample size which would help to evaluate the more precise and accurate results about the factors affecting the quality management of the healthcare system in the UAE. Also, the researchers can explore the quality management of hospitals across countries as well evaluate the effectiveness of these factors. By exploring the factors affecting the quality management of cross-countries, researchers would be able to expand the generalized quality framework that may be applicable globally.

One of the future implications could be the research team can provide a full structure of the quality improvement initiative with a focus on the updated framework dimensions (administrative services, resource management, staff well-being… Patient Health outcomes) and help healthcare facilities to implement and monitor the results.

Researchers may also include the patients who are discharged from the hospitals after getting the treatment. They can be contacted through the records of the hospitals. The benefit of including these patients helps to get more feedback on the quality of care and accurate information about their experience in the hospitals of the UAE. These recommendations will greatly help the researchers to conduct a more effective research in the future.

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The 100 Attributes of Quality Care that are found important from different perspectives and the table below has integrated the all the factor at one place

Acceptability	Capacity	Creativity	Formality	Passion	Satisfaction
Accessibility	Care	Credibility	Friendliness	Patience	Security Sensitivity
Accountability	Cheerfulness	Creditworthiness	Functionality	Patient-centeredness	Shape
Accreditability	Choice	Dependability	Growth Guidance	Performance Pleasantness	Size
Accuracy	Clarity	Durability	Health Helpfulness	Politeness	Skill
Ability	Cleanliness	Ease	Honesty	Precision	Soundness
Adaptability	Collaboration Colour	Education Effectiveness	Hospitality	Predictability Presence	Speed
Adaptively Adequacy	Comfort	Efficacy	Humanity	Price	Stability
Advisability Aesthetics	Commitment	Efficiency	Individuality	Privacy	Structure
Affordability Amenities	Communication	Eligibility Empathy	Informative	Professionalism	Suitability
Appearance	Comparability Compassion	Empowerment	Innovativeness	Profitability Prudence	Support
Applicability Appreciably	Competence	Enthusiasm	Integrity	Punctuality	Sustainability
Approachability	Competitiveness	Environment Friendliness	Intelligent	Purity	Sympathy
Appropriateness	Completeness	Equality	Intensity Involvement	Quiet	Timeliness
Assurance	Comprehensibility	Equity	Joy	Readability	Tranquillity
Attentiveness	Concern	Ethics	Justice	Reasonableness Relevance	Transparency
Attitude	Confidence	Evidence-based	Kindness	Reliability	Trustworthy
Attractiveness	Confidentiality	Excellence	Legitimacy Listening	Repeatability Reputation	Understanding
Authenticity Authority	Conformity	Exclusivity Existence	Love	Respect	Uniformity
Autonomy Availability	Conscientiousness	Expertise Extensibility	Loyalty	Response Responsibility	Uniqueness
Awareness	Consideration	Facilities	Maintainability	Responsiveness	Usability
Balance	Consistency Continuity	Fairness	Measurability	Result orientation	Usefulness
Beauty	Convenience	Familiarity	Motivation	Re-usability Robustness	Utilisation
Benevolence	Cooperation	Fault-free	Necessity	Safety	Validity
Brightness	Coordination	Feasibility Flexibility	Objectivity		Value
	Correctness		Openness Orderliness		Visibility
	Courtesy				
	Coverage				

Questionnaire

Dear Respondent,

We are conducting a research study to identify significant factors that affect the quality of healthcare service provided by healthcare facilities. The questionnaire is divided into four sections, relevant demographic information will be collected in the first section. The other three sections address factors that may influence the quality of healthcare service and are categorized as (1) factors related to the structure of the healthcare facility, (2) factors related to the healthcare providing process itself, and (3) factors related to the process measurable outcomes.

Please provide your agreement level for each of the statements provided. An average of 10 to 15 minutes is anticipated to answer all statements. We value your

time and contributions to this study and we assure you that all provided answers will be anonymized and treated with high confidentiality. No personal identification information will be collected.

Thank you very much for your time and efforts

Research team:

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Part A					
Gender	Male			Female	
Age					
Marital Status	Single		Married	Divorced/ widowed	
Employment:	Full time	Part time	Retired	Not employed	
I work in a healthcare facility:	Yes		No	(I don't work)	
My job description includes management responsibilities:	Yes		No	(I don't work)	
Education level:	Illiterate	Primary school	High school	Diploma or University degree	Masters or PhD
Health insurance:	Government based health insurance		Private health insurance	No health insurance	
Does your health insurance include a co-payment?	Yes		No		

Part B					
Structure of the Healthcare Facility					
According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare provided: (SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree)					
Statement	SA	A	N	D	SD
1- Located at easily accessible/prime location in the city affects the service quality of the hospital					
2- Adequate supplies, resources and services for required treatments affects the service quality of the hospital					
3- Efficient and optimal utilization of resources affects the service quality of the hospital					
4- Support from the hospital administration staff to maintain high grade services affects the service quality of the hospital					
5- Sustainable policies and programs that cater to the concerns of the patients, health professionals and employees affects the service quality of the hospital					
6- Convenient supplementary procedures (Billing, Admission, Discharge, Records keeping and other standard non-medical procedures standard non-medical procedures) affects the service quality of the hospital					
According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare provided:					
7- Physician's involvement in formal decision-making committee of the hospital affects the service quality of the hospital					
8- Physician's involvement into planning and execution of the hospital's decisions affects the service quality of the hospital					
9- Physicians integration into the higher management of the hospital affects the service quality of the hospital					
10- Patient's level of knowledge can be improved by integrating their opinion into organizational decisions of the hospital affects the service quality of the hospital					
11- Patients engagement into organizational					

decisions of hospital affects the service quality of the hospital					
12- Patient-Provider collaborative relationship can improve the decision making of the hospital affects the service quality of the hospital					

According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare provided:

13- Up-to-date& easy to use equipment and facilities affects the service quality of the hospital					
14- Required functionality & safe to operate equipment and facilities affects the service quality of the hospital					
15- Well maintained & regulated equipment and facilities affects the service quality of the hospital					
16- Comfortable and feel at ease environment for any health condition affects the service quality of the hospital					
17- Ideal atmosphere to perform any kind of healthcare service affects the service quality of the hospital					
18- Clean and hygienic environment affects the service quality of the hospital					

Processes of the Healthcare Facility

According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare service processes for staff well-being:

19- Emotional exhaustion decreases the hospital staff's job satisfaction which affects the service quality of the hospital					
20- More work engagement increases the hospital staff's job satisfaction which affects the service quality of the hospital					
21- Depression and anxiety management training and education for staff affects the service quality of the hospital					
22- Compassion and mindfulness training and education for staff affects the service quality of the hospital					
23- Formal training and education of communication for staff affects the service quality of the hospital					

According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare service processes related to technical care:

24- Qualification and knowledge of the medical and non-medical staff affects the service quality of the hospital					
25- Well-experienced hospital staff (medical & medical) affects the service quality of the hospital					
26- Accurate, correct and safe services delivered to patients affects the service quality of the hospital					
27- Appropriate, timely and necessary services should be provided affects the service quality of the hospital					

According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare processes provided lean management:

28- Efficient building architecture/design affects the service quality of the hospital					
29- Efficient building architecture/design improves the hospital's operations which affects the service quality of the hospital					
30- Staff movement to collect patients notes, examination supplies, and not having basic equipment in all examination rooms affects the service quality of the hospital					
31- Excess stock in store rooms, long waiting time to see physician and delay in discharge can affect quality of healthcare services					
32- Re-admissions, incorrect lab tests results, unnecessary duplication of information or treatment provided to patients affects the quality service hospital					
33- Sustainable quality improvement initiatives practiced by hospital affects the service quality of the hospital					
34- Measuring sustainable quality initiative outcomes periodically affects the service quality of the hospital					

According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare service processes related to interpersonal aspects:

35- Comprehensive Information provided by hospital staff affects the service quality of the hospital					
36- Correct information by the hospital staff and easy access to the needed information affects the service quality of the hospital					
37- Sufficient information provided by the hospital					

staff about the patient's health status affects the service quality of the hospital				
38- Hospital staff shows empathy (genuine care, respect) upon patient's interaction affects the service quality of the hospital				
39- Hospital staff shows courtesy and well-mannered behavior towards patients affects the service quality of the hospital				
40- Hospital is punctual in responding to patient's needs affects the service quality of the hospital				

According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare accreditation and benchmarking processes:

41- External assessment of the healthcare processes affects the service quality of the hospital				
42- Regulation & licensing of the hospital affects the service quality of the hospital				
43- Accreditation or affiliation with the well-reputed organization affects the service quality of the hospital				
44- Hospital's participation in national & international quality improvement programs affects the service quality of the hospital				
45- Hospital following the WHO standards and guidelines affects the service quality of the hospital				
46- Hospital having international certification(e.g. JCI, ISO etc.) affects the service quality of the hospital				
47- Bench-marking hospital's supply chain management affects the service quality of the hospital				
48- Bench-marking hospital's IT management affects the service quality of the hospital				
49- Bench-marking clinical outcomes(mortality rates etc.) of the hospital affects the service quality of the hospital				

According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare services technology involvement:

50- Maintaining electronic health record of patients affects the service quality of the hospital				
51- Maintaining electronic service record of hospital staff (employees, nurses, physician etc.) affects the service quality of the hospital				
52- Maintaining electronic record of operation				

theater (no. of Surgeries etc.) affects the service quality of the hospital					
53- Maintaining electronic record of ICU (Intensive Care Unit) affects the service quality of the hospital					
54- Communicating patient's health information(e.g lab results, prescription) through mobile notifications affects the service quality of the hospital					
55- Integration of recent technology(e.g. RFID, Tagging and IoT) into healthcare infrastructure affects the service quality of the hospital					
56- Online physician's consultation and online health awareness sessions (breast cancer, diabetes, stress management etc.) affects the service quality of the hospital					
According to your opinion, to what extent do you agree that the following aspects of a healthcare facility are important in evaluating the quality of the healthcare services in emergency cases (accidents, child birth etc.) handling:					
57- Adequate number of human resources available (nurses and helping staff) affects the service quality of the hospital					
58- Minimum waiting for the physician (e.g. less 10 minutes) affects the service quality of the hospital					
59- Overall high grade performance by the treatment staff affects the service quality of the hospital					
60- Required equipment is ready and available for use affects the service quality of the hospital					
61- Required laboratory facilities ready and available for use affects the service quality of the hospital					
62- Laboratories results are available without unnecessary delay affects the service quality of the hospital					
63- Hospital should have a dedicated emergency management committee (team of doctors, nurses and management) affects the service quality of the hospital					
64- Hospital should reduce/leverage the admission time for emergency cases affects the service quality of the hospital					
65- No unnecessary delay in treatment for emergency situations affects the service quality of the hospital					
Outcome of the Healthcare Facility					

Check all the important attributes of patient satisfaction according to your opinion from the list below, at least check one of the below criteria					
66- Standardization & Accreditation affects the service quality of the hospital					
67- Interpersonal aspects (Communication and attitude of the hospital staff) affects the service quality of the hospital					
68- Technical aspects (competencies and reliability of the hospital staff) affects the service quality of the hospital					
69- Social and Moral aspects (friendliness and honesty of the hospital staff) affects the service quality of the hospital					
70-Physician Care (genuine care, concerned and confidence of the physician) affects the service quality of the hospital					
71- Environment of the hospital (comfort and cleanliness of the hospital) affects the service quality of the hospital					
72- Online services from the hospital (awareness sessions and consultations) affects the service quality of the hospital					

Appendix B

Code

```
Data150[is.na(Data150)] <- 3
library(psych)
library(dplyr)
f1 <- select(Data150,  q1, q2, q3)
f2 <- select(Data150,  q4, q5, q6)
f3 <- select(Data150,  q7, q8, q9)
f4 <- select(Data150,  q10, q11, q12)
f7 <- select(Data150,  q19, q20, q21, q22, q23)
f11 <- select(Data150,  q28, q29)
f12 <- select(Data150,  q30, q31, q32)
f13 <- select(Data150,  q33, q34)
f14 <- select(Data150,  q35, q37)
f18 <- select(Data150,  q47, q48, q49)
f19 <- select(Data150,  q50, q51, q52)
f23 <- select(Data150,  q60, q61, q62)
f25 <- select(Data150,  q73, q74)
f27 <- select(Data150,  q75, q76, q77, q78)
alpha(f1)
alpha(f2)
alpha(f3)
alpha(f4)
alpha(f7)
alpha(f11)
alpha(f12)
alpha(f13)
alpha(f14)
alpha(f18)
alpha(f19)
alpha(f23)
```

```
alpha(f25)
alpha(f27)
library(lavaan)
model <- 'f1=~ q1+q2+q3
f2=~ q4+q51+q6
f3=~ q7+q8+q9
f4=~ q10+q11+q12
f7=~ q19+q20+q21+q22+q23
f11=~ q28+q29
f12=~ q30+q31+q32
f13=~ q33+q34
f14=~ q35+q37
f18=~ q47+q48+q49
f19=~ q50+q51+q52
f23=~ q60+q61+q62
f25=~ q73+q74
f27=~ q75+q76+q77+q78
f1~~f2
f3~~f4
f11~~f12+f13
f12~~f13
z1=~b1*f1+b1*f2
z2=~b2*f3+b2*f4
z4=~b4*f7
z6=~f11+f12+f13
z7=~b6*f14
z8=~f18
z9=~f19
z10=~f23
z11=~b7*f25
z12=~b8*f27
```

```
z1~~z2
z4~~z6+z7+z8+z9+z10
z6~~z7+z8+z9+z10
z7~~z8+z9+z10
z8~~z9+z10
z9~~z10


z11~~z12


d1=~z1+z2
d2=~z4+z6+z7+z8+z9+z10
d3=~z11+z12


d1~~d2+d3
d2~~d3


'
library(lavaan)
fit.cfa<- cfa(model, data=Data150,std.lv=TRUE)
summary(fit.cfa,fit.measures=TRUE,standardized=T)
library(semPlot)
semPaths(fit.cfa,   title   =   FALSE,   curvePivot   =   TRUE,layout   =
"tree2",rotation=2,height=10,width=7)
```

Vita

Waffa Maryam was born in 1992, in Islamabad, Pakistan. She received her BEE degree in Mechatronics Engineering from the Air University Islamabad in May 2016. She was an active member at one of the university's welfare society and has been awarded several merit scholarships throughout the duration of her undergraduate study.

In September 2018, she joined the Engineering Systems Management master's program at American University of Sharjah as a graduate teaching and research assistant. Her research interests are inventory models in healthcare, logistics in healthcare and quality management in healthcare.